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The AUTOMOBILE

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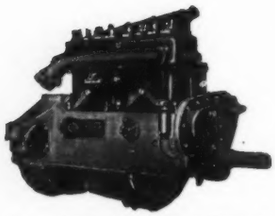
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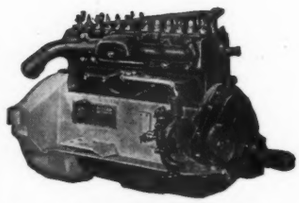
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AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

VOL. XL NEW YORK—THURSDAY, JUNE 26, 1919—CHICAGO NO. 26

S. A. E. SUMMER MEETING

Lighter Cars; Smaller Engines

S. A. E. Speakers Agree as to the Tendency of Design of Automobiles but Vary Many Pounds as to Their Ideas of the Net Result —Changes Favor the Car Owner

900-Pound Five-Passenger Car Is Seen as a Possibility

OTTAWA BEACH, Mich., June 25.

LIGHTER cars, with correspondingly smaller engines and with a trend toward closed bodies, are probabilities of the future in passenger automobile design, in the belief of experts who to-day contributed a symposium of papers to the summer meeting of the Society of Automotive Engineers.

The discussion dwelt also upon the necessity of mechanism designing intended to reduce fuel consumption and to permit utilization of lower grade fuels, economies to be enforced by the country's failing gasoline supply.

The papers forecast the passing of the 8 and 12-cylinder engine, except in occasional construction, holding up as the future standard the 6-cylinder motor for the larger cars and the 4-cylinder for the smaller types.

While foregoing an actual prediction, William B. Stout, consulting engineer of the United Aircraft Engineering Corp., declared it should be possible to build a 5-passenger closed car of present-day performance standard with a weight of 900 lb. Engineering and construction lessons taught by the war, he asserted, had laid the foundation for such an accomplishment.

Herbert C. Snow, engineer of the Winton Co., expressed the belief that the weight of the 7-passenger touring vehicle would be reduced to 3500 or 4000 lb. Resorting on a large scale to the use of alloy steels and aluminum alloy, he forecast, as well, that 5-passenger cars would be brought down to 2500 to 3500 lb., and the smaller machines to 1500 to 2500.

Improvement in car quality, both in design and workmanship, was anticipated by Henry M. Crane, vice-president and chief engineer of the Wright-Martin Aircraft Corp., in a paper which conceded a popular movement toward the closed car, in itself a factor opposing decreased weight. There was a growing demand, in Mr. Crane's opinion, for greater comfort in riding and a nearer approach to noiselessness in the operation of cars, conditions which would call into play the best in creative genius.

Mr. Stout on the 900-Lb. Car

The 900-lb., 5-passenger car, Mr. Stout contended, "should give 30 to 40 miles on a gallon of fuel and 10,000 to 15,000 miles on a set of tires. In riding ease it should surpass anything in heavyweight construction.

THE FUTURE CAR

WILLIAM B. STOUT

We should have a 900-pound, 5-passenger car that will be a better riding car than any now on the market. This will be made possible through war experiments for airplane construction. The body will be of plywood and the engine of 15-horsepower, 6-cylinder, weight 120 pounds. This car should give 30 to 40 miles on a gallon of fuel. The problems are in unsprung weight and axles and drives.

In cost, it should be built for no more money than cars of to-day of equal passenger capacity and performance. The care required to keep the car in shape should be far less than in present construction, and all parts could be oiled from the engine. Freedom from noise and rattles would be a feature, and the life of the car in proportion to its price much increased."

Engines could undergo a real revolution, not only in performance but in design, Mr. Crane stated, adding that a movement toward air cooling was likely, "as it is now possible to build air-cooled engines with a mean effective pressure as high as the best motor-car engines and cool them under motor-car conditions."

He continued:

"A car of 900 lb. weight—and this would mean a revision of some of our suspension ideas to entirely new fundamentals—would need but a good 15-hp. engine and other parts in proportion. This engine, being small, could call to itself the very best workmanship and material, and would not be a success unless it did.

"By the use of many small cylinders, not less than six, and some of the constructional and cooling ideas that have been proved during the war, this powerplant could be laid out as a real thermal job, with no cooling difficulties, and with wonderful economy. It would, of necessity, be radically different from the present-day air cooling to obtain the mean effective pressure desired. Its weight complete need not be over 8 lb. per hp., or 120 lb. for the complete engine with starting equipment. It should turn up to 2600 r.p.m. without undue vibration or power loss. Its cost per pound need not be over twice that of present engines in equal quantities. Since the motor car has become for us an all-the-year proposition there is more reason than ever for eliminating the radiator and its recurrent winter troubles. With the low total weight of the car and the small-bore engine, fuel economy would be far beyond present types."

Mr. Stout looked for wider employment of wood in passenger-car manufacture, declaring that in the production of airplanes for war "we found for the first time what wood was and how to use it, both for strength and for production. We found that wood, combined with the new waterproof glues into multiple units, as a dependable basis of structure under all weather conditions and under severe vibrations and stresses. We found that we could mold it, press it, cut it, and form it in a real production way, and obtain structures with a fraction of the weight for the same strength that was possible with steel. Of course, it had to conform to certain rules of structure, just as steel does, but the result has been proved, and the comparatively low production cost of plywood parts demonstrated. A 5-passenger body on a moderate wheelbase car, without glass, need not weigh over 200 lb., and still be a more permanent structure than a steel-wood combination."

On the question of comfort he said:

"To obtain riding ease the problem of unsprung weight would have to be studied all over again, and many ideas on axles and drive revised to new bases. The load of five passengers being such a large proportion of the total weight, some special type of suspension would become a necessity in the car outlined to obtain easy riding, whether full or part load were on board.

"As to cost of manufacture, this can be figured on a per pound basis, and would allow of higher-class work and materials without increasing the final cost of the car. Because of the lightness and small size of the power and transmission units, great accessibility could be had, while the car of the future, too, should be designed primarily with the owner in mind rather than the factory. This means a car that can be taken care of by the owner, with small outlay of effort or skill and infrequent oiling; a car with no grease cups or unlubricated joints, and an outside design such that a minimum of washing will keep it clean. This refers primarily to wheels, the hardest part of a car to keep looking right. For this reason alone the newer disk wheels have great possibilities.

"The motor car to-day, in its present form, has probably reached a maximum of performance. If we would obtain a radical economy or sales basis or performance, we must look to radical but balanced ideas. We must all admit that the car of to-day is still crude, and even though our shops at present are full of work and our desks of orders, we should remember that the firms which undertake research have always been the leaders, looking ahead, not only toward better engineering for its own sake, but that the per car cost of sales effort may be minimized and the line of sales convincement be more direct."

Mr. Snow for Reliability

In his paper, Mr. Snow regarded reliability, good performance and good appearance salient requisites of a good passenger car.

"In considering reliability," he said, "more attention will be paid to the automatic lubrication of every moving part throughout the chassis with minimum trouble to the owner. Parts which require attention will be made more accessible, minimizing the effort required to keep the car at its best, and enabling worn parts to be replaced more readily. More owners nowadays drive their cars than in the past, and the maintenance of these cars should be as simple as possible. The take-up points for the various adjustments should be located so that they can be reached with ease.

Limit of Acceleration Reached

"In the past 3 or 4 yr. a considerable improvement has been made in the high-gear performance of passenger cars. Acceleration and hill-climbing ability has been increased to a point which might well be considered a maximum for practical service. A car acceleration of from 3¾ to 4 ft. per sec. on direct drive, at speeds of from 5 to 25 miles per hr., with two or three passengers, should be ample. This is equivalent to climbing an 11½ to 12½ per cent grade at a constant speed between 5 and 25 miles per hr. On a lesser grade the car would have surplus power for acceleration. In addition to this low-speed performance a high-grade touring car should be capable of a maximum speed of 60 to 65 miles per hr. The number of miles per gallon of fuel should also be a factor in the performance of the car.

"In designing a car to give this performance, the total

weight of the car is a large factor. The weight of the car in turn is partly dependent on the size and carrying capacity of the body. The present seven-passenger body of a high-grade car is as large and roomy as could be desired, and there should be no need for further increase in size on future cars. This being the case, I believe that the total weight of the large seven-passenger car will be reduced to a point between 3500 and 4000 lb. To make this reduction in weight without any sacrifice in durability means the greater use of alloy steels as well as an increased amount of aluminum alloys. The medium size five-passenger car will weigh between 2500 and 3500 lb., and the small car between 1500 and 2500 lb.

Number of Engine Cylinders

"The size of engine which will give the desired performance to a car of given weight is dependent on the gear ratio and diameter of wheels; or, in other words, the engine revolutions per mile. If a low gear ratio is used, a smaller engine can give the same performance as a large engine with a higher gear ratio. However, the use of the low gear ratio requires a very high engine speed to obtain maximum car speed, and the power may drop off so much at these high engine speeds as to be insufficient to propel the car at the maximum speed desired. In this case it is necessary either to raise the gear ratio and sacrifice the low-speed performance, or to reduce the maximum car speed. By using a transmission with direct drive on the third speed and a geared-up drive on the fourth it is possible still to retain the low axle ratio and have good low-speed performance on direct drive and at the same time to have a higher maximum car speed available on the fourth gear. The objection to this type of drive has been the noise of the fourth-speed gears. I believe that in the future this type of drive will gain in popularity. It is possible that the silent chain will be used in the transmission with considerable advantage in providing a quiet drive for the top speed.

"I believe that the engine for the large car weighing 3500 to 4000 lb. will have a total displacement of between 300 and 400 cu. in. The largest percentage of these engines will undoubtedly have six cylinders. Cars of this class require the best that can be obtained in smooth running and perfect balance. The six-cylinder engine fills this requirement. It also gives good fuel economy and can be made very accessible. In the medium weight class I believe that this type of engine will predominate, but not to quite as great an extent as in the 3500 to 4000 lb. class. The remainder of these cars will be equipped with four-cylinder engines for the most part, as I doubt very much whether there will be many eight or twelve-cylinder engines in cars under 3000 lb. in weight. In the lightweight class I believe that it will be about an even break between four and six cylinder engines.

"Taking up the design of the engine, we can look for the greatest improvement to be made in the cylinders, valve ports, valve mechanisms, manifolds and carbureters. With the fuels growing poorer all the time, the manifolds must be designed to give better distribution, and more heat must be applied to the manifolds to vaporize the liquid fuel on the walls at the lower speeds. To maintain good torque at high speeds the resistance in the manifold, valve ports and in the cylinder around the valves must be kept as low as possible. At the same time the size of these passages should not be made too large, for a high gas velocity must be retained at low speeds. The resistance which the exhaust gases meet when leaving the cylinders is often very high, and considerably reduces the power output. This resistance can be lowered by good valve location, large valve openings, and large and smooth ports and passages. The exhaust valve located in the top of the cylinder head offers much more resistance to the outgoing gases than the L-head location. With the inlet valve the reverse is true. Improvements in the engine of the future cars will be toward an increase in power per cubic inch of displacement, smoother and quiet operation, with freedom from trouble and good economy.

"The ignition system is also important to the satisfactory operation of the engine. The single ignition will be more common. While the battery has been adopted as the only source of ignition on a majority of cars, still the magneto will continue to be used, especially on the higher priced cars.

"The location of the transmission as a unit with the engine will, I believe, be the most popular. The majority of the transmissions will have three speeds, but I believe that the four-speed transmission will be developed."

THE FUTURE CAR

HERBERT C. SNOW

All cars will be lighter. The 7-passenger car weight will come below 4000 lb. There will be fewer 8 and 12-cylinder engines. The heavy cars will have 6 cylinders and the lighter cars 4 cylinders. Changes in the engine will be with a view of meeting requirements of low grade fuels.

Mr. Crane Sees No Chance to Standardize Types

The industry is likely to retain its present multiplicity of car types, according to Mr. Crane's paper.

"The varying tastes and requirements of different people are such," he said, "that with human nature as it is we will see no great change in this direction. On the other hand, the passenger car is being considered more and more from the sole point of view of a means of transportation, and with less regard as to what might be called its sporting characteristics. We are, therefore, seeing the so-called open car, which in the early days was the backbone of production, being replaced more and more by cars with various types of closed bodies. It is easy to remember when the completely inclosed car, such as the sedan, was extremely rare. To-day it is a standard body type in quantity production on cars of practically every grade of price.

Trend Toward Lighter Weight

"While there has been a continuous effort toward obtaining lighter weight, it has barely been possible in any given car to make up by superior chassis design for a constantly increasing weight of body and equipment. Electric starting and lighting and power tire pumps have had to be provided for, while the use of closed bodies has made absolutely necessary a very considerable increase in the weight of chassis frames. Furthermore, the demand for quietness combined with durability has made it difficult to lighten any of the principal parts of the power plant and driving gear materially, some parts, such as crankshafts, being heavier than ever before. The call for easier riding has made necessary a continuous increase in the weight of springs.

Improvement in Quality Expected

"I hope to see in the near future a very considerable improvement in the quality of our production, both as to

THE FUTURE CAR

HENRY M. CRANE

The trend is toward lighter cars. The closed bodies will be made in increased proportion. There will be a greater mileage per gallon of fuel. Maintenance must be made less of a problem for the car owner.

design and workmanship, in all grades of cars, due to much greater attention being given to ease of maintenance and economy of operation than has ever been given in the past. Many of our lower priced cars are far more expensive to operate than they should be, in view of their light weight. It seems to me that a car in ordinary service which will not give from 25 to 35 ton-miles per gallon is open to serious criticism, in view of our failing supply of gasoline. In the future, cars requiring more than 1 gal. of engine oil for each 100 gal. of gasoline are not operating with an economy that should be readily obtainable.

"I think that we will see an increased use of oil for lubricating other chassis parts outside of the engine, and that this use will be simplified, as it has been in many other commercial lines, by a design allowing for carrying a supply of oil at the various points required, which will need only occasional replenishment."

Torque Recoil and Car Weight

In a paper on "Torque Recoil and Car Weight," L. H. Pomeroy, vice-president of the Institution of Automobile Engineers, London, said:

"In the evolution of the automobile few factors have aroused such discussion among users and engineers as that of the desirable number of cylinders that an automobile engine should possess. Certain American makers have pursued the policy of crowding as many cylinders as possible under the bonnet, with a commercial success that has justified this somewhat peculiar method of meeting the conditions with which they were confronted. The buying public were readily persuaded to accept the multi-cylinder engine, for two reasons: First, the plausibility of the argument that high-gear performance depended upon the number of cylinders per se, and, second, the fact that the said high-gear performance with these engines was beyond all question of a very commanding nature.

"For slow-speed running either throttled down on the level or with open throttle on hills the high-gear performance depends upon the ability of the engine to run slowly and upon the gear ratio. The slow running ability of a four-cylinder engine is practically limited only by its flywheel weight taken as an engine, but when mounted in a car the whole mass of the car may be considered as flywheel mass, provided no definite reversal of torque takes place, such as may be due to misfiring.

"On the other hand, the slow running ability of either a six, eight or twelve-cylinder engine involves a much greater accuracy of valve timing, carburetion and ignition. In my experience I have been able to obtain much better slow-speed running with four-cylinder engines than with six or twelve-cylinder units. It is quite easily possible to throttle a high efficiency engine of the four-cylinder type down to 160 r.p.m., giving a speed of about 4 m.p.h. with a gear ratio of 4 to 1. The impressive slow running performance of the multi-cylinder cars is, in my opinion, much more a function of the gear ratio than of the number of cylinders.

"Without going to extremes, flywheels can be made heavy enough on four-cylinder engines so that when running slowly there is no noticeable variation of angular velocity and hence a jerky motion of the car as a whole. In other words, to judge the uniformity of torque given by a four-cylinder engine as compared with a twelve-cylinder one by superposing the torque diagrams is a gross misrepresentation of the facts.

"It is when the subject of torque recoil is discussed that the advantages of the multi-cylinder engine become manifest. The torque produced by the explosion spends itself in part by accelerating the flywheel, thus producing an equal and opposite recoil which is transmitted to the engine supports. At high speeds this recoil vibration is so rapid as to be practically continuous. The speed at which, other things being equal, this continuity is produced depends upon the number of cylinders and the magnitude of each individual recoil, i. e., at part throttle the effective continuity will occur at a slower speed than at full throttle and will also occur at a slower engine speed, for say an eight-cylinder engine than for a four cylinder. It is clear, however, that with any number of cylinders there is a point at which the torque recoil ceases to be noticed. The point at issue is as to how far it is really necessary to increase the number of cylinders to avoid the manifestations of torque recoil to such a degree as to excite the sensitiveness of the expert driver. Upon this subject the following observations may be made:

"(1) There is in fact what may be called a recoil flywheel effect due to the mass of the cylinders and crankcase. If these were of great weight the torque recoil would be absorbed by these to a large extent instead of being transmitted to the engine support almost in full as is the case with engines of normal weight, particularly at low speeds.

"(2) The mounting of the engine itself plays an important part in the impression of torque recoil continuity. By suitable means the effect of torque recoil in a four-cylinder engine can be damped out, so that even at low speeds it is almost imperceptible. I refer particularly to the method of mounting the engine upon a subframe, thus avoiding the direct recoil which occurs when the engine is mounted directly upon the main frame. It is not possible to reduce this effect to figures easily, but a little consideration will show that even at comparatively low engine speeds the periodicity of the torque recoil is sufficiently rapid that during the time the recoil from one cylinder is being absorbed and delivered to the main frame, another is being imparted, and so on.

"For a given engine speed and gear ratio the torque recoil as has been stated is proportional to the mean effective pressure and the number of explosions per unit time. Increasing the size of cylinder, but keeping the torque the same, will, therefore, not affect the torque recoil, owing to the consequent reduction in brake mean pressure for a given torque. Torque recoil then is independent of the cylinder size for any given torque. Increasing the number of cylinders, keeping the torque the same, will reduce the torque recoil effect in proportion to the increase in the number of explosions per minute.

"From the point of view of power and acceleration cars may be classified in terms of the power exerted by the engine, the road speed at which this power is exerted and by the total weight. These factors determine the acceleration or liveliness of the car, its capacity to climb hills and to accelerate. For any given gear ratio, then, the horsepower of the engine should be in proportion to

the total weight. The low limit of the high-gear ratio is determined by the maximum speed at which the engine will run and give a satisfactory road speed.

"For automobile engines of moderate size, say not exceeding 4-in. bore and 6-in. stroke, the limiting speed, or that at which the maximum power is attained, does not vary greatly, being somewhere between 2500 and 3000 r.p.m. For the purpose of discussion, there is no reason why the same gear ratio should not be used with an engine of say 4-in. bore and 6-in. stroke, as with an engine of 3½-in. bore and 5-in. stroke. It is clear, then, that for the same high-gear ratio power in proportion to the total weight may be read as torque in proportion to the total weight.

"From the user's standpoint the multi-cylinder engine is regarded as advantageous in respect to high-gear work on the hills and on the level, characteristics in which such engines have certainly no advantage in respect of the number of cylinders per se. The prevalence of this opinion is a costly one for both the industry and the owners, however useful it may have been as a sales policy to save a situation endangered from other causes. It will be interesting to see how far the economic considerations which are the basis of all sound engineering will ultimately affect design in the respects discussed.

"I am strongly of the opinion that in the near future the chassis will be designed to suit the body work and that there will be broadly two types of chassis, the one suitable for heavy closed and open bodies and the other suitable for bodies of the roadster type. Such a development would lead probably to the conclusion that the light chassis would be capable of dealing with considerably heavier bodies than those for which it was originally designed. This would allow the lightening process to be repeated without involving the commercial danger of marketing a light chassis for all purposes. As has been shown, a reduction in car weight would enable the existing standards of performance to be maintained and even improved with the use of four-cylinder engines for the lighter chassis and a maximum of six cylinders for the heavier type and all that this means in its tremendous advantages to the automotive industry and to the user."

THE FUTURE CAR

L. H. POMEROY

The 4, or at most, the 6-cylinder engine will meet all demands. This change will be of an economic value. The future chassis will be made in 2 types, one for heavy bodies, the other for roadster type. I look for the lighter chassis to be used with the 4-cylinder engine and the heavier body with the 6-cylinder as a maximum.

New British Low-Priced Car

A LIGHT car, assumedly built to compete with American productions both as regards price and scale of manufacture, has just made its appearance in England. It is the product of Wm. Cubbitts & Sons of London.

The engine is a four-cylinder monobloc, with the head separate and integral with the water outlet pipe. The bore and stroke are 80 x 140 mm. (3.15 x 5.5 in.), giving a capacity of 2185 cc. (133 cu. in.). The crankshaft is a forging ground on the journals only, and there are three main crankshaft bearings of great length. At the end of the crankshaft itself is a helical gear operating the camshaft. Connecting rods of H section are used, with bronze bushings for the piston pins. Special bronze buffer pieces are fitted at the ends of each piston pin, to prevent it scoring the cylinder walls. The cams and shaft are in one piece, which runs in three bearings, the camshaft being increased in diameter at these three points.

The valves are of nickel steel, and are operated by disc-ended tappets having adjustable heads, the cams striking these tappets in such a manner as to cause them to rotate.

The ignition, lighting and starting sets are on orthodox American lines. No magneto is fitted, the current being taken through a battery and coil from the lighting dynamo. The starter is of the usual Bendix drive type.

Crank bearings are lubricated by an automatic pump run off the camshaft. Enough oil escapes from the big-end bearings to lubricate the cylinder walls and piston-pin bushings, and the lowest of the three piston rings is fitted with a skirt to prevent too much oil reaching the combustion chamber.

The oil pressure gage is of novel character, and most ingenious. Oil is led from the engine to one side of a thin steel diaphragm. Any oil pressure must therefore bend the diaphragm. On the other side of this diaphragm is a chamber filled with red liquid, and leading out of this chamber is a single glass tube. As the oil pressure rises, it forces the red liquid up the tube in sight of the driver, the tube being placed in a special socket on the dashboard. As this would be difficult to see at night, the back of the tube is coated with a luminous preparation, which makes it clearly visible even on the darkest night.

The cooling is by gear pump through a very high radiator placed in front of the car. The carbureter intake manifold is waterjacketed.

Housed in a special coned ring bolted to the cast-iron flywheel is an inverted, fabric-lined cone clutch. The cone itself is an aluminum casting, and the pilot bearing consists of two ball races. The universal joints are of the fiber, or fabric, type, one in front of and one behind the gearbox. The latter is of cast iron and carries four speeds forward and one reverse. There is an exceptionally large cast-iron lid for the gearbox, which makes the whole mechanism readily accessible. At the rear end of the gearbox is a contracting fabric-lined brake, operated by a cam mechanism connected with a pedal. The arms for the forward fabric disc joint of the propeller shaft form part of this brake drum, and the propeller shaft itself is taken direct from this joint to another, similar in every way, bolted to the pinion shaft of the back axle. The back axle is of the helical-gear type.

The wheels are of the pressed-steel disc type and are easily detachable by unscrewing five nuts on the hub. From the owner's point of view the chassis lubrication of the car is exceptionally good, there being not a single grease cup on any part of the mechanism.

The standard body is a five-passenger touring, built entirely of steel by the Messrs. Cubbitts. An idea of the size of the machine may be gained from the fact that it has a 126-in. wheelbase.

The car will be completely equipped with a self-starting and lighting set, five lamps, top, adjustable windshield, and spare wheel with tire and tube. The price is $1,100 and it is hoped to produce more than 20,000 cars next year.

THE manufacture of parts to gages, so as to make them interchangeable, is believed to have been introduced by Colonel Colt in the manufacture of rifles at the time of the Civil War.

S. A. E. SUMMER MEETING

How the Automotive Industry Can Help Avert a Fuel Crisis

Do Not Attempt to Solve This Problem by Trial and Error, but Organize, Study and Build Co-ordinately for Industrial and Scientific Achievement, Advises Authority

OTTAWA BEACH, Mich., June 24.—Prof. Joseph E. Pogue made an earnest appeal at the S. A. E. Summer Meeting today for prompt and concerted action by the automotive industry toward solving the fuel problem. He said that the industry should assume its share of the responsibility for meeting the coming shortage of motor fuel, which he regarded as increasingly serious.

Prof. Pogue's paper was supplemental to his article published in AUTOMOTIVE INDUSTRIES on June 12 (Engineering Issue). In that paper he presented his reasons for believing that the shortage was inevitable, due to the shortage in the basic supply of petroleum and that this shortage, unless overcome, would develop into a serious handicap on the industry. The speaker represented the Division of Mineral Technology, U. S. National Museum.

In his paper read today Prof. Pogue outlines what he believes should be undertaken. He said in part:

"The automotive industry has an unescapable concern in the problem because the highly specialized fuel requirements of the prevailing type of automotive apparatus limits the quantity of engine fuel that may be commercially produced from the output of crude petroleum. * * *

"The low thermal efficiency or high fuel consumption of the prevailing type of automotive apparatus contributes strongly to the demand for engine fuel, requiring gasoline to be produced in far greater quantities than would be necessary if the fuel were more efficiently utilized. Every gain in thermal efficiency, therefore, means a corresponding increment to the fuel supply. Increased thermal efficiency may also be made to compensate the consumer for such advances in fuel prices as may develop. Thermal efficiency, therefore, has a pivotal bearing upon the quantity and price of engine fuel and though now tending to work to the disadvantage of the automotive industry may be turned to its advantage.

"On four counts, the automotive industry finds itself responsible in respect to fuel where it had no concern in the past. If the conclusion is correct that fuel is now to dictate to the engine, the engine should listen well to all that fuel has to say.

What Has Been Done

"In the past few years there has been a growing recognition that the rapid advance in automotive construction was creating a fuel problem which the automotive interests themselves would have to share in solving. This feeling, however, was scattered and ill-defined and did not find official recognition until the 1919 Annual Meeting of the Society of Automotive Engineers, when a session was devoted to a consideration and discussion of the engine-fuel situation.

"In the spring of 1919 the second stage in the solution of the problem was entered upon with the establishment of a committee of the Society of Automotive Engineers charged with considering ways and means for active work on the fuel problem. A fuel research organization was projected by this committee and the organization, scope and program of the new agency are now (June) under formulation. At the same time the newly formed American Petroleum Institute, representative of the oil industry, has under advisement the establishment of an agency of contact and co-operation with the automotive activity. Thus the initial machinery has been established." * * *

Functions of a Research Organization

According to the speaker the action necessary to secure a solution of the problem involves three stages:

1—Economic analysis to determine what is needed to be done.
2—Material research to build up new technology.
3—Co-ordination between the industrial activities concerned to facilitate the adoption of a new technology and to remove cross-purpose development.

"It cannot be emphasized too strongly that the problem is not one that will yield to dissociated research alone. The activity connoted by the term 'research' has unfortunately taken on a very narrow meaning in the popular mind, at the same time that it has assumed a sort of magic quality as being a panacea if only applied intensively enough. The gravest danger at the present stage in the development of a fuel research organization is that it will be projected along conventional lines too narrow to admit the full range of technique—analysis, material research, co-ordination—essential to adequate progress.

The Role of Economic Analysis

"The part that economic analysis should play in connection with material research has not been absolutely ignored in the past, but it has not been accorded its due rank as a matter open to rigorous scientific cultivation.

"It should be clearly appreciated that the factors in

the engine-fuel situation are in course of constant change, and no program of work can be effective which is not based upon careful, scientific evaluation of these variables. The problem, being composed of variables, then, is distinctly not a static matter, and accordingly it cannot be treated as if it were a fixed specific issue.

"More specifically still, it is conceived to be the function of economic analysis to study and interpret the various engine fuels, such as gasoline, kerosene, fuel oil, benzol,, alcohol, shale-oil distillate, etc., in respect to resources, production, trend of prices, economic status, interrelationships, technical development and so on. At the same time, in the light of their bearing upon fuel, the various automotive developments should be appraised, in respect to output, efficiency, trend of changes, price relationships, etc.

The Role of Research

"Research is a tool for building up technology in any direction desired. To be effective, it should be applied to critical and pivotal points. Results are too laggard and costly, if research is not directed by economic need, although the term should be given a broad interpretation in this respect.

"Enough is already known of the economics of the engine-fuel situation to feel that among the matters calling most insistently for research are carburetion to permit the use of difficulty vaporizable fuels and combustion to increase thermal efficiency.

"To secure proper research attention to these and related matters will require the co-ordination of the many individual research activities—industrial, governmental and university laboratories, etc., which now have facilities for conducting research; and a central laboratory to devote adequate attention to the more basic and elaborate lines of work not adequately being handled by the individual agencies.

The Role of Co-ordination

"There must in addition be a bringing together, a co-ordination, of the various industrial activities concerned under a consistent and harmonious policy, which will insure an appropriate adoption of technologic advances and especially smooth out such competitive cross-currents as may be blocking a favorable development of the matter. The utmost in investigation and research will avail nothing, if the aggregate of policy is not brought under a measure of scientific control sufficient to insure a harmonious development in respect to fuel.

"Since both fuels and engines are in course of change, though periodically standardized, it is obvious that a paramount problem is to insure, so far as possible, a parallel and complementary development of the two.

"If it should turn out that trucks and tractors adopt the heavy-oil engine as an outcome of experience, a remedial loss will have been sustained if this is allowed to come about by a process of trial and error.

"On the basic issue of fuel policy, competitive effort may advantageously give way to co-operation. As an illustration, the fuel policy most advantageous for the tractor industry is contingent upon the fuel policy adopted by the truck industry, and in turn is not unaffected by what is developing in respect to passenger cars. Without the closest understanding between the three, the tractor policy would stand only the vaguest chance of being correct.

The Type of Organization Requested

"It is probable that many who have given attention already to the engine-fuel problem have felt disappointed that a more definite and specific program for attack has not been offered. The present undeniable state of perplexity as to exactly what should be done is due to the fact that no one knows, nor can know, in advance, exactly what should be done. I think that the practical step now is to establish an organization broad enough to attack the problem at all its vulnerable points. If this is done on a scale commensurate with the magnitude of the issue and with a personnel equal to the responsibility, the industry may feel assured that it has taken the only practical step toward bringing the full quota of modern scientific methods to bear on the matter."

Lively Discussion of Dr. Pogue's Paper

In opening the discussion of Dr. Pogue's paper, Chairman Bachman outlined the activities of the S. A. E. in connection with the fuel problem since last February. Two meetings, he said, had been held, one at Washington and one at New York, at which the outlook had been discussed jointly by representatives of the automotive and of the oil industry. A joint committee was established, Mr. Bachman said, which would lay out a program of work somewhat as outlined in Dr. Pogue's paper.

Mr. Hinkley complained that engine builders were asked to design their engines to use very divergent fuels. The city of Detroit had approached the fuel problem and drafted comparatively simple specifications based on the distillation characteristics which the fuel sold in the city must meet. This had solved the problem there for the time being. The engine builders wanted "a mark to shoot at," he said, and would like to have the subject of fuel characteristics settled for five years at least. If a man bought a first-class car, he sometimes deluded himself that it would last him a lifetime, but in a few years it would not burn the fuel then available.

Mr. Cardulls said there were five lines of attack on the fuel problem that had occurred to him:

1—To forbid the use of the lighter petroleum fractions in fuel oil.
2—To encourage the development of an automatic gas generator for producing a fixed gas from the heavier hydrocarbons for use on trucks and tractors.
3—The development of engines and carbureters for heavy oil.
4—The induction of more economical vehicles, possibly of reduced high gear ability, and having a greater number of gears.
5—The production of a sympathetic fuel, drawing upon all the various fuel sources available.

Mr. Smith said that it was up to engine designers to meet the problem. Local restrictions would not solve it. It was also pointed out in the discussion that the public should be exhorted to economize.

As an instance as to what expenses we have gone in powering passenger vehicles, it was stated that on a certain high-grade car the throttle was opened 12 degrees 50 minutes when running at 50 m.p.h., over a smooth level highway. Another fact that tends to enhance the scarcity of motor fuel is that gas companies are using fuel oil to enrich their gas, as the practice

(*Continued on page* 1451)

S. A. E. SUMMER MEETING

Visualizing the Future Truck

Why It Will Have 4-Speed Transmission
Changes for the Pneumatic Tires
Developing an Ability Formula

OTTAWA BEACH, MICH, June 24—The future of the truck was the chief topic at the morning session. Louis P. Kalb discussed the relative high and low gear ability of the truck of the future and the changes that must be made in the design of the truck to make pneumatic tires an economical part of the equipment.

Mr. Kalb, who was assistant supervisor of engineering of the Standard Parts Co., Cleveland, Ohio, presented his paper under the title, "The Relation of Motor Truck Ability to the Trend of Design," as follows:

This article is intended, however, to treat the subject of motor truck ability from the standpoint of its relation to present trend of motor truck design, attempting to set forth some of the fundamental considerations involved therein.

All engineering calculations are based upon what may be termed "factors of experience." For example, in calculating the section of a front-axle I-beam, a formula is used containing that stress which experience has shown to be safe for this particular duty. The purpose, then, of an ability formula when applied to automotive vehicles is to determine a "factor of experience" from which the proper engine size and gear ratios can be calculated.

Measurement of Performance

The performance of automotive vehicles is properly measured by their comparative ability to perform the function for which they are intended. It is logical then that passenger car performance be measured in terms of speed and acceleration. In the case of motor trucks, however, these are not the most important considerations, it being almost universal practice to limit the speed by a governor, which in itself minimizes the importance of acceleration. Furthermore, wind resistance is negligible, so that practically the only resistances to be overcome by a motor truck are road friction and the force of gravity. The performance of motor trucks can therefore be measured simply by their ability to overcome these two forms of resistance.

Now both road and grade resistance are in direct proportion to the weight carried and can be expressed in unit terms such as pounds per pound and pounds per ton of total load.

If the tractive force which the driving wheels of a truck are capable of exerting be expressed in the same terms, it then becomes a simple matter to compare the resistance to be overcome with the force available for doing it. This unit tractive force is therefore the best index of the ability of a motor truck.

It might be well to call attention to the incorrectness of the idea held by some that a truck's ability is affected by the location of the driving wheels and the distribution of the load. The fact is that it makes no difference whether the drive be through the front, the rear, or all four wheels, or whether the load be carried on the truck or on a trailer; the total resistance and consequently the force required to overcome it will be the same. There are in more or less general use a number of ability formulas of indisputable merit, and, in addition to these, many engineers have their own pet ways of expressing ability which best serve their own purposes. All of these formulas are based upon the same fundamentals and to consider the subject in an intelligent manner, let us get a correct understanding of these fundamentals by building up from first principles.

Ability Formula

The maximum tractive force available at the tires of the driving wheels is expressed by the following formula:

$$F = \frac{2\,GA\,R\,E}{D} \text{ where} \qquad (1)$$

F = Tractive force in lb.
GA = Maximum brake torque of engine in in.-lb.
R = Total reduction of ratio of engine to wheel speed
E = Efficiency between engine and wheels
D = Diameter of driving wheels in in.

Now the engine torque may be expressed in terms of piston displacement as follows:

$$GA = \frac{Pb\,V}{12.56} \text{ where} \qquad (2)$$

GA = Engine torque in in.-lb.
Pb = Brake mean effective pressure in lb. per sq. in.
V = Total piston displacement in cu. in.

Substituting this value for GA in equation (1), we have the tractive force expressed in terms of piston displacement.

$$F = \frac{V\,R\,Pb\,E}{6.28\,D} \qquad (3)$$

The tractive force per unit of weight may be expressed

$$T = \frac{F}{W} = \frac{V\,R\,Pb\,E}{6.28\,D\,W} \text{ where} \qquad (4)$$

W is the total weight of the vehicle, body and load. Now if W is expressed in tons, T will be the tractive force in pounds per ton, and if in pounds T will be expressed in pounds per pound. Both methods of expression have their advantages. Road resistance being commonly expressed in pounds per ton, it is, of course, convenient to express ability in the same terms. However, as will be

shown later, grade resistance is more conveniently expressed in pounds per pound. It also seems that the formula should contain only one unit of weight. In my estimation, therefore, the best measure of truck ability is the tractive effort in pounds per pound.

All of the factors involved in equation (4) can be readily determined with the exception of mean effective pressure and efficiency. Both of these quantities are rather indeterminate. Not only do different designs of trucks vary considerably in respect to these features, but even trucks of the same make and type are quite likely to show an appreciable difference.

Pb being the index of engine output per unit of piston displacement, is, of course, affected by all the factors by which engine output is controlled, such as carbureter setting, ignition and valve timing, condition of valves, pistons, etc. Efficiency is also affected by many factors, such as design of transmission and axle, type of drive, effectiveness of lubrication, etc.

When possible it is, of course, desirable to use values determined by actual tests made on the truck under consideration. This generally involves much time and effort, which makes this information rather difficult to obtain. To make this formula general in its application and easy to apply, we will assume certain values of *Pb* and *E* which approximate as closely as possible the average values for various designs of engine and types of drive. A good average value for *Pb* is 85 lb. per sq. in. A number of truck engines develop more than this on the block, some giving as high as 93 lb. per sq. in. However, very few engines give this later output on the road, and the lower figure approximates very closely what can be expected from most truck engines in service.

It has been quite common to assume *E* to be 85 per cent on direct drive and 70 per cent in gear. Recent tests show that a more correct assumption would be 90 per cent on direct drive and 85 per cent in gear. Substituting these values in equation (4) we have

$$T = \frac{12.15\ V\ R}{D\ W} \text{ in direct drive} \qquad (5)$$

$$T = \frac{11.5\ V\ R}{D\ W} \text{ in gear.} \qquad (6)$$

to distinguish *T* from other factors for expressing ability, I shall hereafter refer to it as the "ability coefficient."

The hill-climbing ability of a truck may be expressed in terms of ability and road resistance by the following formula:

$$G = T\left(\frac{1 + R^2}{\sqrt{T^2 - R^2 + 1} - T\ R}\right) - R \text{ where} \qquad (7)$$

G = Per cent grade truck can just climb with road resistance R
T = Ability coefficient in lb. per lb.
R = Road resistance in lb. per lb.

For the average values of *T* and *R*, the quantity in the parenthesis is so close to unity that for all practical purposes, the formula can be expressed

$$G = T - R \qquad (8)$$

In other words, the grade that a truck will climb is equal to the net drawbar pull expressed in pounds per pound.

Let us compare equations (4), (5) and (6) with some of the other ability formulas now in use. H. K. Thomas's ability formula is expressed as follows:

$$Q = \frac{3000\ d^2\ s\ n\ r}{D\ W}$$

C. T. Myers's vehicle coefficient is expressed

$$V\ C = \frac{8\ n\ d^2\ s\ r}{D\ W}$$

while the formula suggested by Mr. Roebuck is

$$K = \frac{14{,}550\ d^2\ s\ n\ r}{D\ W}$$

The similarity of all these formulas is apparent. Each one involves piston displacement per unit of weight moved a unit distance and differs only in the constants and assumed values for engine output and efficiency.

The vehicle coefficient of Mr. Myers and the ability coefficient expressed in equations (4), (5) and (6) possess the advantage that they represent a concrete quantity and can be used to determine drawbar pull and hill-climbing ability. If it were desired to make the expression for ability an abstract quantity which could be used for comparative purposes only, the formula

$$K = \frac{V\ R}{D\ W}$$

would answer all requirements. This formula involves only known variables and is reduced to the simplest terms.

As stated previously, any expression of ability involves piston displacement per unit of weight moved a unit of distance. A rearrangement of equation (4) will illustrate this point.

$$T = \frac{Pb\ E}{2} \times \frac{V\ R}{\pi\ D\ W}$$

and the second factor equals cubic inches of piston displacement per pound moved 1 in. Motor truck fuel consumption is generally expressed in pints per ton-mile. On account of the varying throttle openings, it cannot be said that fuel consumption will vary directly as the piston displacement; nevertheless, other things being equal, the greater the piston displacement, the greater the amount of fuel drawn into the engine during a given number of revolutions, and consequently, the greater the ability, the greater will be the fuel consumption per ton-mile. Therefore the penalty that must be paid for ability is reduced fuel economy.

If road and grade resistance were constant it would be quite a simple matter to design for an ability just sufficient to overcome this resistance and we would thus have a maximum economy at all times. However, hills do exist and road resistance varies widely. In some localities the grades never exceed 6 per cent, while in others they run as high as 30 per cent. Road resistance varies from 0.0075 lb. per lb. for good asphalt, to 0.1800 lb. per lb. for a sand road, loose sand and plowed ground going even higher than this.

High-Gear Ability

To determine in advance just what the ability of a truck should be would appear a rather difficult task. In general, it can be said that high-gear ability should be sufficient to overcome average road resistance with a sufficient surplus to climb the grades that are encountered with such frequency that gear shifting would be objectionable. The low-gear ability should be sufficient to overcome practically the worst conditions of grade and road.

A study of the abilities of existing trucks shows that practice varies widely upon this point. In the smaller sizes, ranging from 1000 to 2000 lb. capacity, there seems to be a tendency toward passenger car ability. This seems quite logical, for most of these trucks run on pneumatic tires and at speeds which call for that ability necessary for acceleration and overcoming wind resistance.

Some of the most successful vehicles in this class have a high-gear ability coefficient of from 0.085 to 0.090. It might be noted that this is greater than foreign practice for passenger cars, but somewhat lower than American passenger car practice, which varies from 0.085 to 0.105.

In the larger sizes of truck, that is, from 1½ to 6 tons capacity, operating at moderate speeds and on solid tires, abilities vary from about 0.06 to 0.08 lb. per lb. A good average of present successful practice would be around 0.0675 to 0.074.

In determining the proper ability coefficient to use in new designs, it would be unwise to follow present practice blindly. In fact, it is my opinion that the proper high-gear ability for a truck is much lower than the average figure given above. There are a number of causes which tend to make the average engineer lean toward excessive ability. The fact that it is so difficult to determine just what proper ability is, leads the engineer toward unnecessarily high ability just for the sake of being on the safe side.

Until recently, the great majority of trucks on the market had three-speed transmissions with rather limited low-gear reductions. Undoubtedly excessive high-gear abilities were necessary in many cases to have anything like adequate ability on low gear. Furthermore, the great majority of truck buyers judge a truck merely by its power, forgetting entirely the effect that excessive ability has upon economy.

Engineers must, of course, design what the public wants or thinks it wants. An effort should be made, however, to educate users on this point and bring them to understand that high ability costs money. Some consistent propaganda along this line would undoubtedly cause truck users to modify their demands appreciably.

The use of trucks in country districts is increasing, but it is hardly right to penalize the great majority of trucks which are operated on improved roads for the sake of the few that operate in rural districts over unimproved roads.

The fuel problem is one which is becoming more serious daily, and the constantly increasing number of trucks in service is certainly not tending to alleviate the situation. If this growth is to continue unhampered, something must be done both to improve truck economy as well as to enable trucks to operate upon the poorer grades of fuel which are now available.

The truth of this statement is shown by the fact that marine engines, whose power factors are much lower than those of passenger cars or trucks, operate satisfactorily on kerosene. This has never been successfully done with either trucks or passenger cars.

Ideal Design of Truck

The ideal design of a truck is one which combines maximum economy with adequate ability. Now, since trucks operate at least 90 per cent of the time on high gear, the interests of economy will be served if we keep high-gear ability down to the minimum. In my opinion, the ability coefficient in high gear should be about 0.063 to 0.066 lb. per ton. As stated previously, the low-gear ability of a truck should be sufficient to overcome the worst conditions of road and grade. This is a requirement which it is impossible to fulfill entirely. The best that can be done is to utilize all of the ability that the adhesion of the driving tires will permit. This can be done by making the low-gear ratio sufficient to almost slip the wheels under full engine torque.

The coefficient of adhesion of solid tires to dry macadam is about 0.60, while on a sand or mud road it would not exceed 0.45. It is on the latter type that the greatest ability is required. Therefore, if the tractive force be made about 45 per cent of the load on the rear wheel, we will have the maximum ability that the traction of the driving tires will permit.

The proportion of total weight on the rear tires is about 77 per cent. The low-gear ability coefficient should therefore be

$$T\,L = 0.770 \times 0.450 = 0.346 \text{ lb. per lb.}$$

The low-gear ratio of the transmission should then be

$$r = \frac{0.346 \times 0.900}{0.063 \times 0.850} = 5.8 \text{ to } 1$$

Such a low-gear reduction as this would, of course, require a four-speed transmission. About the maximum ratio obtainable with a three-speed transmission is 4 to 1, and anything greater than this would cause very unsatisfactory gear changing. Four-speed transmissions have in the past been the exception, and even those which did exist did not have anything approaching the proper low-gear ratio. In fact, the idea of utilizing all of the available traction on low gear seems to have become popular in the last few years.

The Class B truck is, in a way, responsible for the rapid growth of the idea, although not for its inception, as it afforded engineers a large scale demonstration of the principle. Anyone who has seen the B truck negotiating roads and grades over which other very good trucks were unable even to move could not but be impressed.

Increasing Low-Gear Ability

Increasing low-gear ability will, of course, require a proportionate increase in the size of torque-carrying members back to the transmission, such as propeller-shafts and live axles. However, the design of such parts to meet these conditions is a very simple and exact proposition. Since the torque required for slipping the wheels is a definite proportion of the load upon the tires, the torque and load-carrying members of the axle can be proportioned accordingly. Since it is impossible to impress a torque upon the axle greater than the adhesion of the tires will transmit, it will be impossible with an axle so designed to over-stress the torque-carrying members no matter how large an engine or how low a gear ratio is used.

Propeller-shaft brakes also cease to be a bugaboo, for tire adhesion limits braking torque just as much as it does propelling torque. The advantages of this should appeal to axle manufacturers. Even without increasing the strength of the torque-carrying members increased low-gear ability should tend to reduce rather than to increase the strain on these parts. With adequate low-gear ability it is no longer necessary to speed up the engine and drop in the clutch suddenly to get out of bad holes. Instead, an even, steady torque is applied, which does much less harm than the shock of a suddenly applied torque. I know of an instance where the breakage of live axles was actually eliminated in a fleet of trucks operating in a very severe service by increasing the low-gear ability.

The objection raised to reducing high-gear ability is that such a move would not meet with favor in the eyes of truck users. To judge the merits of this objection, let us compare the hill-climbing abilities of two trucks, one with a high-gear ability coefficient of 0.072 and a three-speed transmission with a low-gear reduction of 4 to 1 and the other with a high-gear ability coefficient of 0.063 and with a four-speed transmission having a low-gear reduction of 5.8 to 1. Assuming that the road resistance is 0.03 lb. per lb., the three-speed truck will

be able to climb a grade of 4.2 per cent on high gear. On low gear this truck will have an ability coefficient of 0.272 lb. per lb., and will be able to climb a grade of 24.2 per cent. The truck with the four-speed transmission will be able to climb a grade of 3.3 per cent on high gear. On low gear this truck will have an ability coefficient of 0.345 lb. per lb., and will be able to climb a grade of 31.5 per cent.

Now where is there a driver who can distinguish between a 3 and a 4 per cent grade? The difference between a 24 and a 31 per cent grade, however, is quite appreciable.

The maximum ability of a truck is that on low gear, and consequently the power of a truck will be judged more by its low-gear than by its high-gear ability for the same reason that the speed of a truck is judged from its maximum or high-gear speed.

Any trend of design, to survive, must be fundamentally correct. I have endeavored to set forth some of the principles upon which the present trend toward four-speed transmissions is based and to show why the trend is bound to grow in spite of the inertia which all radical changes in design must overcome.

There is another trend in the motor truck field in connection with which the matter of ability should be given some careful consideration. That is pneumatic tires for large trucks. I will not attempt to discuss all of the problems involved in this subject which are perplexing truck engineers at the present time, such as brakes, turning radii, body height, etc., but will confine myself to the problems in which the question of ability is involved.

The strongest reason for the use of pneumatic tires on heavy trucks is to be able to increase the speed and consequently the ton-miles per day without injury to the vehicle. From a standpoint of dollars and cents, I do not see how pneumatic tires can be sold to replace solid ones unless this is accomplished. Undoubtedly the cost of pneumatic tires is higher than that of the solid type, and unless the owner is able to get an increased return on his total investment, due to an increase in ton-miles, he cannot be induced to invest the extra money in pneumatic tire equipment. Increasing the truck speed means an increase in engine speed or a reduction in gear ratio. It certainly is not desirable to increase engine speed, for, as surely as this is done, an increased amount of trouble will result.

Now any reduction in gear ratio will result in lowered ability. No one knows whether road resistance is more or less with pneumatic than with solid tires. This much we do know, however. When the speed of a truck is appreciably increased, the ability should approach closer to that of passenger cars. Road and grade resistance are no longer the only forms of resistance to be overcome. Not only does wind resistance become a considerable factor at higher speeds, but the car must have an ability reserve to accelerate to this increased speed within a reasonable length of time. Thus, the use of pneumatic tires calls for not only increased speed, but increased ability. Power being the product of force by velocity, it is evident that the engine must develop horsepower. It being inadvisable to increase the engine velocity, it is evident that the engine must develop greater horsepower. It being inadvisable to increase the engine speed, there is only one thing left to do, and that is to increase the size of the engine. This means a corresponding increase in the transmission drive shafts, and, in fact, in all the power-transmitting parts of the chassis. There is no doubt that the use of pneumatic tires will permit an appreciable reduction in the weight of all load-carrying parts of the chassis. I am inclined to believe, however, that this saving will be offset by the increase in the engine and other power-carrying members, so that there will be n ultimate saving in weight or cost.

Let us compare a 3½-ton truck, intended to operate on solid tires, with one designed especially for the pneumatic type. The specifications of the solid-tire truck may be assumed somewhat as follows:

Total weight of vehicle, lb. 15,300
Rear tire size, in. . . . 36 x 5 dual
Speed, miles per hr. 14
Engine size, in. . . . . 4½ x 5¾
Piston displacement, cu. in. 365.8
Axle ratio. . . . . 8¾ to 1
Engine speed, r.p.m. 1141
Ability coefficient, lb. per lb. . 0.07

For the pneumatic-tire truck, let us assume a speed of 20 miles per hr. At this speed we should have an ability of about 0.08 lb. per lb. in order not to exceed 1200 r.p.m. engine speed. With 44 x 10-in. rear tires the axle ratio should be approximately:

$$\frac{1200}{152.6} = 7.87 \quad \text{say } 7\tfrac{3}{4} \text{ to } 1$$

The piston displacement would then be

$$V = \frac{D\,W\,T}{12.15\,R} = \frac{44 \times 15{,}300 \times 0.08}{12.15 \times 7.75} = 578 \text{ cu. in.}$$

This is approximately the displacement of a 5½ x 6 or a 5¼ x 6½-in. engine, and is even larger than is used for a 5-ton truck on solid tires.

I do not wish to be understood as opposing pneumatic tires for trucks. In fact, I believe that the increased use of pneumatic tires will greatly widen the field of usefulness of motor trucks, and should be encouraged by all truck builders. **The point that I wish to bring out, however, is that high-speed pneumatic-tire trucks and slow-speed solid-tire trucks are fundamentally two very different propositions and should be treated as such. To operate successfully on pneumatic tires a truck should be especially designed for this service and should partake more of the characteristics of a large passenger chassis than do the trucks now operating on solid tires.**

In conclusion, I want to impress upon you the fact that ability is not an abstract quantity of purely academic interest, but is a factor having a direct bearing upon the most important problems of motor-truck engineering.

PNEUMATIC TIRE TRUCK

KALB *says:*

The added cost of tires must be covered by the increased ton-miles per day by speed.

Reduction in gear ratio means less ability, so speed must be gained by larger engines.

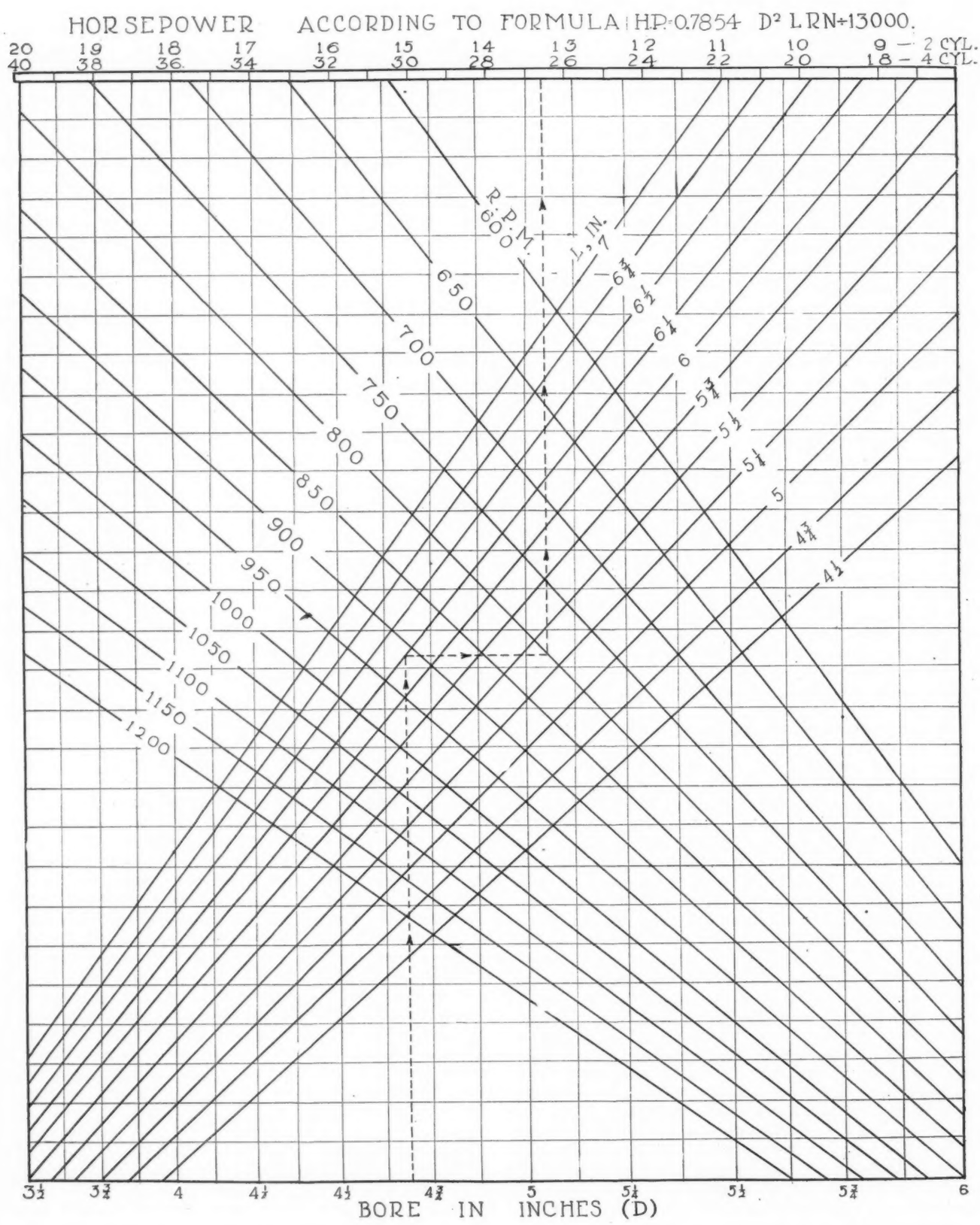
Pneumatic tires will permit reduction in weight of carrying parts, but this will be overcome by heavier engines.

To operate successfully on pneumatic tires, the truck chassis should have characteristics of large passenger chassis.

The Discussion

President Moseley asked A. B. Bachman, chairman of the Standards Committee to take the chair for the discussion, because of his practical knowledge of the truck situation. The rooms were filled to capacity for this session, as it was understood that there were to be interesting developments. (*Continued on page* 1451)

Tractor Rating Chart Prepared by the S. A. E.



S. A. E. SUMMER MEETING

Standards Committee Rejects Only One Proposal of Divisions

Tank and Radiator Cap Recommendation Fails—Lively Discussion Over Adoption of Formula Engine Rating as Suggested by Tractor Division

OTTAWA BEACH, MICH., June 23.

THE sharpest discussion in the session to-day of the Standards Committee considering the recommendations of the various divisions was brought about by the suggestion that the S. A. E. should depart from its usual practice and adopt a formula of engine rating as recommended practice. The question came up in connection with the tractor division report, particularly as regards the horsepower formula for tractor engines.

H. L. Horning expressed the view that the S. A. E., as an engineering body, should not depart from its precedents in this regard. He cited the action of the Society in not endorsing the A. L. A. M. formula and said he thought this was a question for the industry to solve, rather than this body. Dent Parrett gave notice of an appeal to the Society for action on the question, on the basis that the tractor division of the S. A. E. is the only technical body representing that industry.

John R. Cautley suggested that the committee do not pass the recommendation as a standard or as a recommended practice, but commend it to the manufacturers of tractors and stationary engines as a fair commercial rating. This met the approval of the committee.

The committee rejected only one recommendation, that of the tank and radiator cap. The suggestion made with the rejection was that S. A. E. threads be adopted if possible. J. J. Aull made this suggestion.

The remainder of the report of the miscellaneous divisions was approved with the comment that the drawing of the steering wheel hub was out of scale and should be revised.

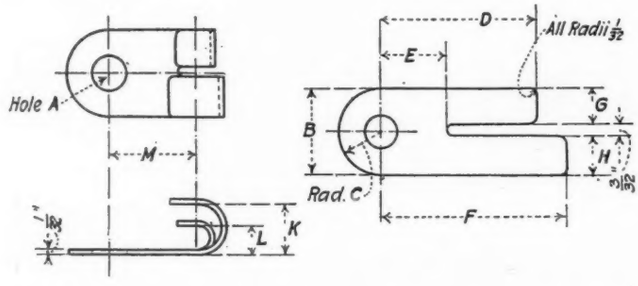
Report of Divisions as Revised and Approved by Standards Committee

The standard battery ratings shall be established at a standard temperature of 80 deg. fahr.

The rated capacity of storage batteries for farm lighting service shall be based on a final voltage of not less than 1.75 volts per cell.

The period of elapsed time at which the rated ampere-hour capacity is available shall be definitely stated.

In rating farm lighting batteries, the maximum available capacity can be obtained intermittently, or over prolonged discharge periods shall be limited to that obtainable over a



Terminal Stud Sizes.	Dia. of Hole.	B	Rad. C	D	E	F	G	H	K	L	M
No.8(0.1640")	0.171	3/8	3/16	19/32	5/16	3/4	1/8	5/32	5/32	5/64	11/32
No.8(0.1640")	0.171	13/32	13/64	43/64	5/16	27/32	1/8	3/16	3/16	3/32	3/8
No.10(0.1900")	0.201										
No.14(0.2420")	0.2570	1/2	1/4	27/32	3/8	1 3/32	3/16	7/32	1/4	1/8	1/2

Material—To be Specified By User.

NOTE:—These Terminals are not intended for Use on Ignition Distributors.

The side-type cable terminal

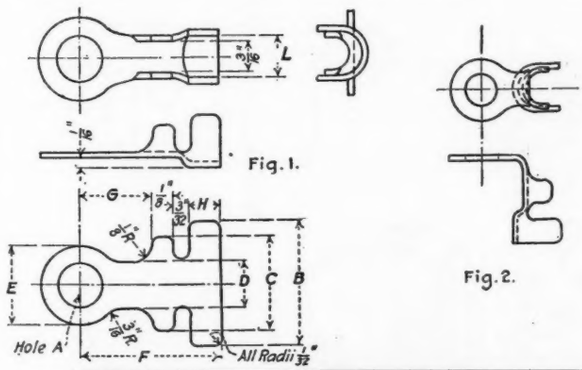


Fig. 2.

Terminal Stud Sizes	Dia. of Hole	B	C	D	E	F	G	H	L	Thick.
No.8(0.1640")	0.171	11/16	15/32	7/32	3/8	3/4	3/8	5/32	7/32	0.031
No.10(0.1900")	0.201									
No.14(0.2420")	0.2570	23/32	17/32	1/4	15/32	13/16	13/32	3/16	1/4	0.040

Material—To be Specified by User.

NOTE:—The Terminals as Formed in Fig. 1. may also be Formed as shown in Fig. 2.
These Terminals are not intended for Use on Ignition Distributors.

Spade-type cable terminal for generators, switches and meters

period of 72 hours. The capacity which can be obtained over a continuous discharge period of 8 hours shall be stated.

The standard test shall be at a rate of 1/24 of the ampere-hour capacity of the battery for an initial period of 4 hours, followed by a 16-hour rest; and then by two 8-hour periods, each followed by a 16-hour rest. After the last rest the final discharge period shall be 4 hours.

Note: All of the above is applicable to nickel iron batteries, except the final voltage per cell, which applies to lead batteries only. The short periods at the beginning and at the end of the test permit it to begin at noon of the first day and end at noon of the last day.

Barrel Mounting of Starting Motors

The present recommended practice for barrel mounting of starting motors is revised in that definite limits for the gear location of the starting motor with respect to the flywheel are provided, a pitch line clearance of 0.015 to 0.025 in. instead of 0.015 in. being recommended.

Focusing Lengths of Incandescent Lamps

Tolerances are placed on the location of the filament within the bulb with respect to the lamp axis, as follows:

Deviation along axis of base	± 3/32 in.
Deviation at right angles to axis of base	± 5/64 in.

It is recommended that the above deviations be reduced by the incandescent lamp manufacturers so that the allowable deviation from the axis of the base is no greater than one-half of the base of the filament field for any type of incandescent lamp.

Lens Sizes

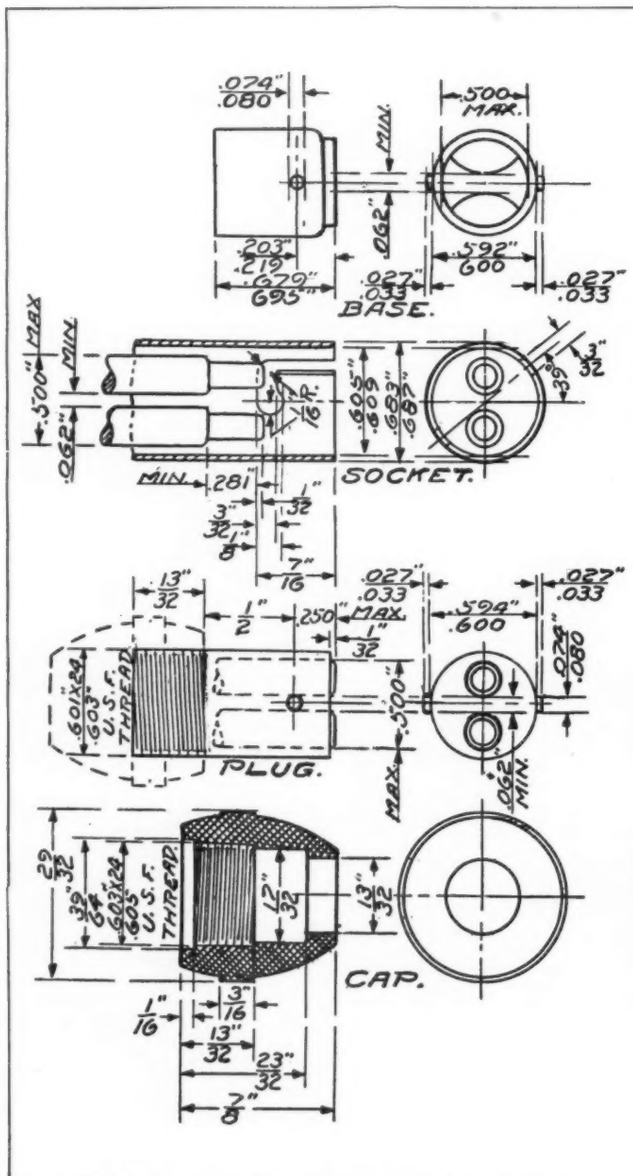
The following standard outside diameters and diameters of prism area are recommended:

Outside Diameter of Lens	Diameter of Prism Area
8⅛ + 1/32, — 0	6⅞ ± 1/32
8½ + 1/32, — 0	7¼ ± 1/32
9 + 1/32, — 0	7¾ ± 1/32
9½ + 1/32, — 0	8¼ ± 1/32

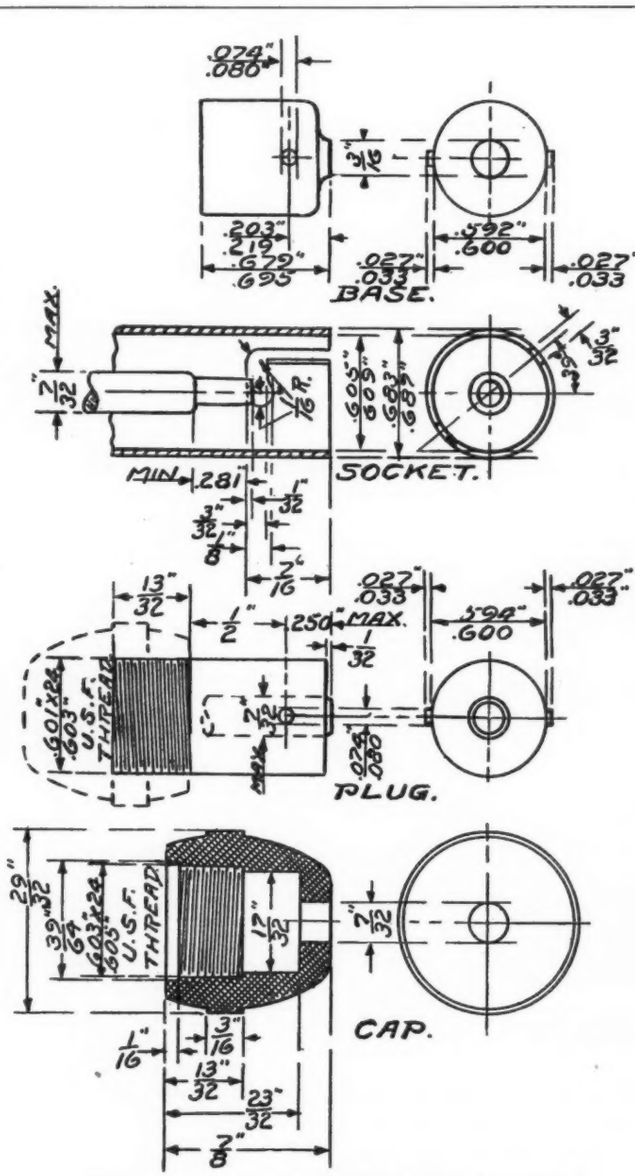
Thickness of bevel edge for all sizes is to be ⅛ in., plus 1/32, minus 0. This is commonly known as double thick American glass.

Bases, Sockets and Connectors

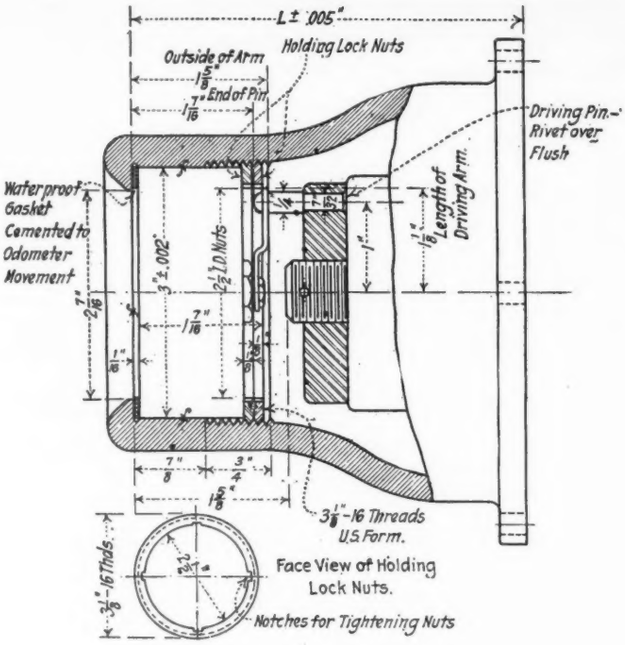
Revisions are recommended in the specifications for bases, sockets, plugs and caps for insulated- and ground-return sys-



Electric base, socket, plug and cap for insulated-return system



Electric base, socket, plug and cap for ground-return system



Hub odometer

tems, these revisions bringing the S. A. E. standards in line with present practice. The two accompanying cuts show the new standards.

Screw Stock

Two screw stock materials are recommended, both corresponding with specifications of the American Society for Testing materials. These are No. 1112, Bessemer screw stock, and No. 1120, open-hearth screw stock, these superseding No. 1114 S. A. E. specification, which included both Bessemer and open-hearth stock. These two steels are intended for general automatic screw machine products not requiring more particular properties.

S. A. E. Specification No.	Carbon	Manganese	Phosphorus	Sulphur
1112	0.08 to 0.16	0.60 to 0.80	0.09 to 0.13	0.075 to 0.15
1120	0.15 to 0.25	0.60 to 0.90	0.06 maximum	0.075 to 0.15

Chromium Steels

S. A. E. Specifications Nos. 5195, 51120 and 52120 are eliminated and the chromium limits of Specifications Nos. 5120, 5140 and 5165 are changed from 0.65 to 0.85 per cent with 0.75 per cent desired to 0.60 to 0.90 per cent with 0.75 per cent desired. Specification No. 5295 is replaced by Specification No. 52100 with the analysis given below. Steels that do not appear to be necessary are thus eliminated and replaced with one fully representative type of oil-quenching steel.

The S. A. E. Standard for chromium steels as thus revised by the Division is as follows:

S. A. E. Specification No.	Carbon: Minimum and Maximum	Carbon: Desired	Manganese: Minimum and Maximum	Manganese: Desired	Phosphorus (Maximum)	Sulphur (Maximum)	Chromium: Minimum and Maximum	Chromium: Desired
5,120	0.15 to 0.25	0.20	*	*	0.04	0.045	0.60 to 0.90	0.75
5,140	0.35 to 0.45	0.40	*	*	0.04	0.045	0.60 to 0.90	0.75
5,165	0.60 to 0.70	0.65	*	*	0.04	0.045	0.60 to 0.90	0.75
52,100	0.95 to 1.10	1.00	0.20 to 0.50	0.35	0.03	0.03	1.20 to 1.50	1.35

*Two types of steel are available in this class, one with manganese 0.25 per cent to 0.50 per cent (0.35 per cent desired), and silicon not over 0.20 per cent; the other with manganese 0.60 per cent to 0.80 per cent (0.70 per cent desired), and silicon 0.15 per cent to 0.50 per cent.

Nickel-Chromium Steels

A change is to be made in the specification numbers, as follows:

Present Specification No. X3315 to be changed to No. 3415, No. X3335 to No. 3435, No. X3350 to No. 3450. The object of these changes is to obviate mistakes in telegraphic orders, etc.

Tungsten Steels

Two tungsten steel specifications, suitable for high tungsten steel for exhaust valves, are recommended, these corresponding to Signal Corps specifications W-60 and W-60-A. They are as follows:

S. A. E. Specification No.	Carbon: Minimum and Maximum	Carbon: Desired	Manganese, Maximum	Phosphorus, Maximum	Sulphur, Maximum	Chromium	Tungsten
7060	0.50 to 0.70	0.60	0.30	0.035	0.035	3.00 to 4.00	12.00 to 15.00
7160	0.50 to 0.70	0.60	0.30	0.035	0.035	3.00 to 4.00	15.00 to 18.00

Hub Odometers for Trucks

It is recommended to standardize the housing dimensions as per the drawing below.

Steering Wheel Hub

The following table in connection with the dimension diagram gives the proposed steering wheel hub standards.

The nut dimensions in the table, which are submitted as general information only, allow for the proper seating of the nut on the pad (diameter F):

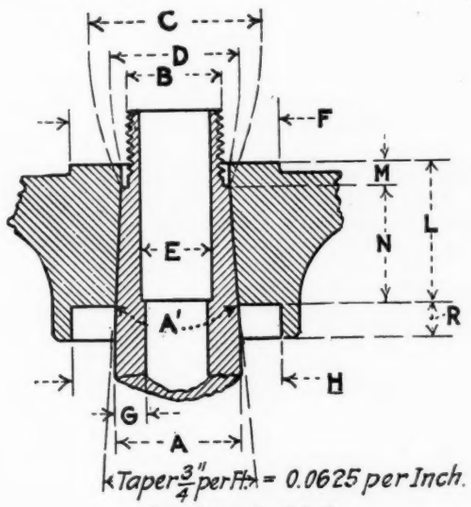
All Threads U. S. F.

	6	7	8	9	11
A	7/8	1	1 1/8	1 1/4	1 1/2
A'	0.870	0.994	1.118	1.242	1.490
B	3/4 20	7/8 20	1 20	1 1/8 18	1 1/4 18
C	(0.8075)	(0.92174)	(1.03597)	(1.150203)	(1.37672)
	0.8075	0.9217	1.0360	1.1502	1.3767
H	1 9/16	1 13/16"	1 13/16	2 1/16	2 5/16
F	1 1/2	1 3/4	2	2 1/4	2 3/8
L	1 7/8	1 5/16	1 15/32	1 5/8	2
M	1/8	5/32	5/32	5/32	3/16
N	1	1 5/32	1 5/16	1 15/32	1 13/16
R	3/8	7/16	1/2	9/16	5/8
D	(0.799687)	(0.91197)	(1.02620)	(1.14044)	(1.3650)
	0.7997	0.9120	1.0262	1.1404	1.3650
E	19/32	23/32	51/64	59/64	1 3/64
G	5/32	5/32	3/16	3/16	1/4

STEERING WHEEL NUT SEAT DIMENSIONS.

Screw Size	Wall	Short Diam.	Long Diam.	F
3/4—20	5/32	1 1/16	1 15/64	1 1/2
	1/4	1 1/4	1 7/16	
7/8—20	3/16	1 1/4	1 7/16	1 3/4
	1/4	1 3/8	1 19/32	
1 —20	3/16	1 3/8	1 19/32	2
	7/32	1 7/16	1 21/32	
1 1/8—18	3/16	1 1/2	1 47/64	2 1/4
	1/4	1 5/8	1 7/8	
1 1/4—18	3/16	1 5/8	1 7/8	2 3/8
	9/32	1 13/16	2 3/32	

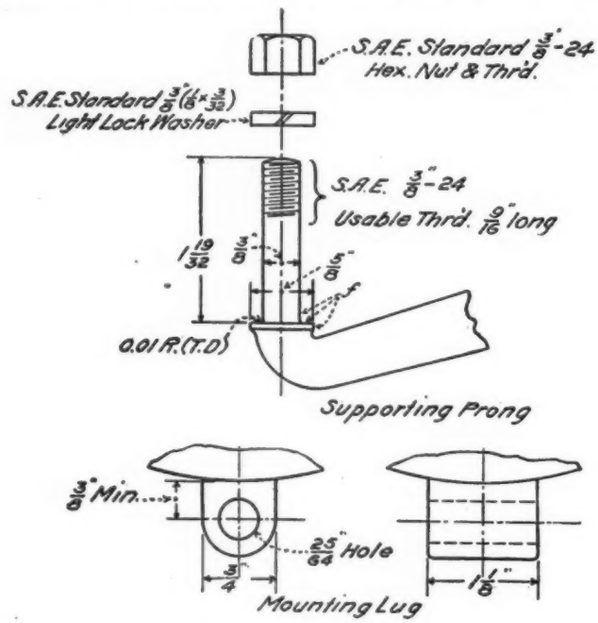
All dimensions in inches.



Steering wheel hub
Committee ruled drawing out of scale

Headlamp Mounting Lugs and Supporting Prongs

The following, which is established practice, is recommended as S. A. E. standard and to replace the present S. A. E. Recommended Practice on the subject:



Headlight mounting lugs
and rounded-edge taper holes

Motorcycle Chains

Motorcycle driving chains shall be of the roller type with the following dimensions: Pitch, ⅝ in.; roller width, ⅜ in.; roller diameter, 0.40 in.

Motorcycle Adoption of Existing S. A. E. Standards

The approval of the following existing S. A. E. standards and recommended practices for motorcycle practice is suggested:

Cotter pins, screws and bolts, screw threads, square broached fittings, taper fittings, 4-spline fitttings, taper fittings with castle nuts, steel specifications, babbitt metal, bearing metals, brass casting metals, cast manganese bronze, manganese bronze sheets and rods, hard cast bronze, gear bronze, aluminum alloys, brass sheets and strips, brass rods, Tobin bronze rods, non-ferrous metal tubing, nomenclature of roller-chain parts, roller chain dimensions, test specimens for iron and steel, cold-drawn seamless steel tubes, steel bands and strips, brake linings, annular ball bearings, light series; annular ball bearings, tolerances; electric bulbs oversize cylinders, piston-ring grooves.

Stationary Electric Engine Rating

The Tractor Division recommendation on nominal tractor engine ratings is proposed for adoption as S. A. E. standard for stationary engine practice.

Voltage and Capacity Ratings Electric Lighting Outfits

Farm lighting plant voltage and capacity ratings shall be according to the accompanying table.

Normal Ratings in K.W.	Nominal Voltage (16 cells)	Eng. and Gen. R.P.M. (Direct Coupled)
½	32	1200
¾	32	1200
1	32	1200
1½	32	1200
2	32	1200
3	32	1200
5	32	1200

S. A. E. Engine Testing Forms

The present S. A. E. Standard Engine Testing Forms are suitable for stationary engine work with certain additions and changes, as follows:

Sheet A—No additions or changes.

Sheet B—(a)—Addition of "Normal Horsepower" after "Name and Model."
(b)—Addition of "Normal R.P.M." as Item No. 2a.
(c)—Addition of the sub-division "Cooling System" after "Lubricating System" with the following items:

Air-Cooled .....Water-Cooled. { Radiator, Capacity, Gal....Lb...
Tank, Capacity, Gal....Lb...
Hopper, Capacity, Gal....Lb...

(d)—Addition of "Nominal Rated Horsepower" formula in Item No. 3:

$$\frac{0.7854\ D^2LRN\ \ldots\ldots}{13000}$$

Sheet C—Addition of "Weight of Water Evaporated" after "Temperature of Jacket Water-Out" under "Brake Horsepower and Fuel Consumption" and "Friction Horsepower" subdivisions.

Sheet D—Addition of R.P.M. ordinates from 0 to 1300 above that part of the present ordinates reading from 200 to 2800.

It is understood that these additions will be marked so as to refer to footnotes on all sheets reading "For use with stationary, gas and farm engines only."

Round Pipe Flanges for Stationary Farm Engines

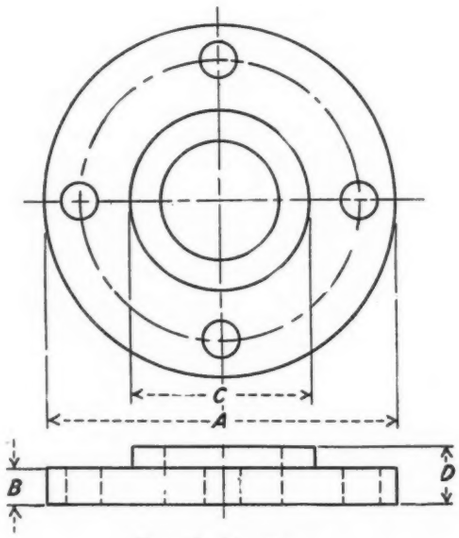
Size of Pipe in Inches	External Diameter, A	Thickness, B	Diameter of Hub, C	Length of Hub, D	Diameter of Bolt Circle	No. of Bolts	Size of Bolts
1	4	7/16	1 15/16	11/16	3	4	7/16
1¼	4½	½	2 5/16	¾	3⅜	4	7/16
1½	5	9/16	2⅝	⅞	3⅞	4	½
2	6	⅝	3⅛	1	4¾	4	⅝
2½	7	11/16	3⅝	1 1/16	5½	4	⅝
3	7½	¾	4 5/16	1⅛	6	4	⅝
3½	8½	13/16	4⅞	1 3/16	7	4	⅝
4	9	15/16	5⅜	1 3/16	7½	4	⅝
4½	9¼	15/16	5 13/16	1¼	7¾	8	¾
5	10	15/16	6 7/16	1 5/16	8½	8	¾
6	11	1	7 9/16	1 7/16	9½	8	¾

NOTE.—These dimensions conform with the A. S. M. E. and the American Manufacturers' Standard for 125-lb. American Standard Flanges.

Threads to be American Briggs Standards taper pipe threads (A. S. M. E. Sept. 17, 1913).

Motorcycle Spark Plug Shell

The ⅞-in. hexagon spark-plug shell and tapped hole dimensions and tolerances for the ⅞"-18 U. S. F. thread, are recommended for an S. A. E. motorcycle standard. As the tapped hole tolerances given are considered too wide for motorcycle practice, the following complete specifications for S. A. E. Recommended Practice are suggested:



Round pipe flanges
Drawing to be changed to show fillets and rounded edge taper hole

Spark Plug Thread Dimensions

Diameter	Maximum Mm.	Maximum Inch	Minimum Mm.	Minimum Inch
Outside (full)	....	0.709	....	0.706
Pitch (effective)	....	0.670	....	0.667
Root (core)	....	0.626	....	0.623

Tapped Hole Dimensions

Diameter	Maximum Mm.	Maximum Inch	Minimum Mm.	Minimum Inch
Outside (full)	....	0.719	....	0.717
Pitch (effective)	....	0.674	....	0.672
Root (core)	....	0.636	....	0.634

These tolerances are now being specified and are suitable for standard, requiring only a little better grade of workmanship allowed in using the aeronautic tolerances.

Solid Tire Sizes

Inches	Mm.	Inches	Mm.
32x3	75/660	36x 6	150/762
32x3½	90/660	40x 6	150/864
34x3½	90/711	36x 7	176/762
36x3½	90/762	40x 7	175/864
32x4	100/660	36x 8	200/762
34x4	100/711	36x10	250/762
36x4	100/762	40x10	250/864
34x5	125/711	40x12	300/864
36x5	125/762	40x14	350/864
40x5	125/864		

NOTE—These tire sizes have already been adopted by N. A. C. C. and the Rubber Association of America.

Solid Tires for Single and Dual Wheels

The following definite front and rear wheel application of the proposed solid tire sizes is recommended as supplementary to the proposed standard:

Tires for single wheels		Tires for dual wheels		
32x3	36x4	36x4	36x 8	(Single tire fits 36x4 dual wheel)
32x3½	34x5	36x5	36x10	(Single tire fits 36x5 dual wheel)
34x3½	36x5	40x5	40x10	(Single tire fits 40x5 dual wheel)
36x3½	36x6	40x6	40x12	(Single tire fits 40x6 dual wheel)
32x4	36x7	40x7	40x14	(Single tire fits 40x7 dual wheel)
34x4				

Carrying Capacity of Solid Tires

Solid tire width	Up to and including 36 in. diameter	40 in. diameter
3	1000	....
3½	1300	....
4	1700	....
5	2500	2600
6	3300	3500
7	4200	4500
8	5200	5600
10	7000	7500
12	....	9500
14	....	11500

Solid Tire and Wheel Diameters, Wheel Circumferences

Nominal outer diameter of tires In.	Nominal outer diameter of tires Mm.	Actual diameter over steel bands In.	Actual diameter over steel bands Mm.	*Actual circumference over steel bands In.	*Actual circumference over steel bands Mm.
32	810	26	660.4	81 11/16	2074.7
34	860	28	711.2	87 31/32	2234.3
36	910	30	762.0	94 1/4	2393.9
40	1010	34	863.6	106 13/16	2713.1

*These felloe circumferences are given with the tolerances neglected. The tolerances are shown at the bottom of page 8a, S. A. E. Handbook, Vol. I.

Base Bands for Solid Tires

Base Band Size	A	B	Limits of B	C	*Corrugations No.	*Corrugations D	E	G	F
3	2 3/32	3 1/8	± 1/32	5/16	16	0.181	2 5/32	3 1/16	5/64
3½	3/4	4 1/4	± 1/32	1 1/32	18	0.191	3 1/16	3 9/16	1/16
4	2 3/32	4 13/16	± 1/32	3/8	20	0.196	3 5/64	4 1/16	9/128
5	2 3/32	5 3/8	± 1/32	7/16	26	0.189	4 5/64	5 1/16	9/128
6	2 3/32	6 3/8	± 1/32	7/16	32	0.185	5 5/64	6 1/16	9/128
7	2 3/32	7 3/8	± 1/32	7/16	36	0.192	6 5/64	7 1/16	9/128
8	1/8	8 3/8	± 3/64	7/16	40	0.196	7 3/32	8	5/64
10	1/8	10 3/8	± 3/64	7/16	50	0.196	9 3/32	10	5/64
12	1/8	12 3/8	± 3/64	7/16	60	0.197	11 3/32	12	5/64
14	1/8	14 3/8	± 3/64	7/16	70	0.197	13 3/32	14	5/64

NOTE.—The above values correspond to those adopted by the War Service Committee of the Rubber Industry of the U. S. A.
*Either mill corrugated or dovetail facings may be used.

Solid Tire Sections

The 3-in. solid tire sectional area is to be included in the present standard so that it will conform to the proposed solid tire standard.

Solid tire widths, in.	*Minimum total sectional area or rubber, sq. in.
3	....
3½	6.75
4	7.75
5	10.75
6	13.75
7	16.75
8	19.75
10	25.75
12	31.75
14	37.75

*Includes both hard and soft rubber.
NOTE—The above values correspond to those adopted by the Solid Tire Division, War Service Committee of the Rubber Industry of the U. S. A.

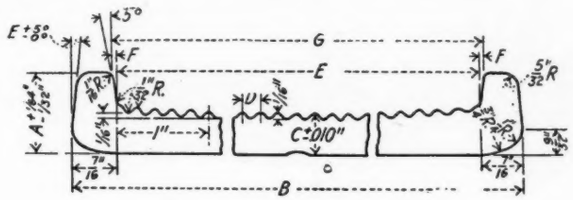
Section Dimensions of Single and Dual Solid Tire Wheels

The steel band thickness for the felloe bands for the 3½ and 4-in tires be changed from ¼ to 5/16 inches.

Pneumatic Tires and Rims for Passenger Cars and Commercial Vehicles

Nominal tire and rim sizes Inches	Nominal tire and rim sizes Mm.	Oversize tire Inches	Oversize tire Mm.	Tire-seat dia. (rim) Inches	Tire-seat dia. (rim) Mm.	Type of rim
30x3½	90/585	31x4	105/585	23	585	Clincher
32x3½	90/635	33x4	105/635	25	635	Straight side
32x4	105/610	33x4½	120/610	24	610	Straight side
33x4	105/635	32x4½	120/635	25	635	Straight side
32x4½	120/585	33x5	135/585	23	585	Straight side
34x4½	120/635	35x5	135/635	25	635	Straight side
36x6	150/610	38x7	175/610	24	610	Straight side
38x7	175/610	40x8	200/610	24	610	Straight side
40x8	200/610	....	.....	24	610	Straight side

NOTE—These tire and rim sizes will be the only ones used on manufacturers' equipment after January 1, 1919, and conform to Bulletin No. 267 of the National Automobile Chamber of Commerce.



Base band for solid tires

Carrying Capacities and Inflation Pressures of Automobile Pneumatic Tires

Tire size	Fabric tires for passenger cars: Maximum load per tire	Fabric tires for passenger cars: Corresponding air pressure	Cord tires for passenger cars: Maximum load per tire	Cord tires for passenger cars: Corresponding air pressure	Cord tires for commercial vehicles: Maximum load per tire	Cord tires for commercial vehicles: Corresponding air pressure
3	375	45	400	40	....	....
3½	570	55	600	50	....	....
4	815	65	850	60	850	70
4½	1100	75	1200	70	1200	75
5	1500	85	1700	80	1700	80
6	....	....	....	....	2200	90
7	....	....	....	....	3000	100
8	....	....	....	....	4000	110
*9	....	....	....	....	5000	120
*10	....	....	....	....	6000	130

*The loads and pressures for these sizes are S. A. E. Recommended Practice only.

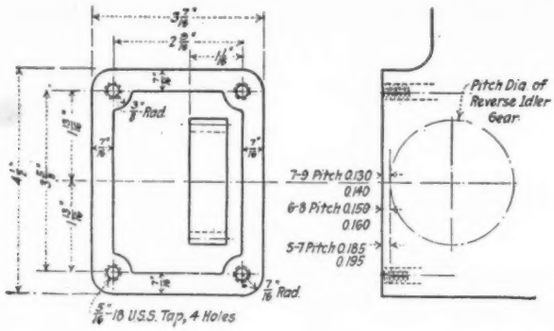
Wood Felloe Dimensions for Pneumatic Tire Rims

VALVE HOLE DIMENSIONS FOR DEMOUNTABLE RIMS
Wood Felloe Dimensions

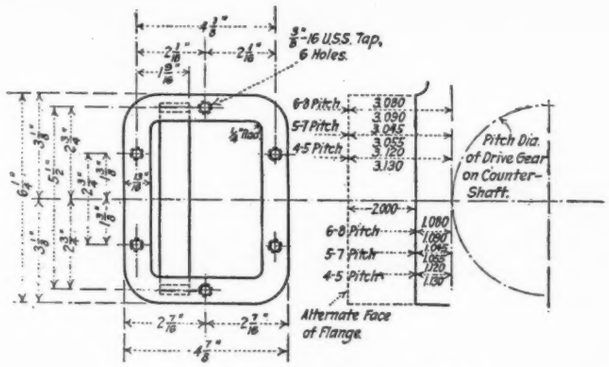
Nominal tire and rim size	†Width	†Depth
30x3½	1½	1¼ { + 1/16 — 0
32x3½	1½	1¼ { + 1/16 — 0
*32x4	1¾	
33x4	1¼	1¼ { + 1/16 — 0
*32x4½	2⅛	
34x4½	2⅛	1¼ { + 1/16 — 0
36x6	3¼	1⅝ ± 1/16
38x7	3 29/32	1⅝ ∓ 1/16
40x8	4¼	1⅝ ∓ 1/16
*44x10	5¼	1⅝ ± 1/16

Dimensions in inches.

*These sizes are new.
†Width of felloes for demountable rims on cold rolled bands.
NOTE—The above values correspond to those adopted by the Automotive Wood Wheel Manufacturers' Association.



Small type mounting for air pump



Large type mounting for air pump

Rims, Cleats and Lugs for Tractor Wheels

Tractor Front Wheels

PLAIN FLAT PLATE RIMS

Wheel Diameter, in.	Width of Face, in.	Thickness of Rim, in.
28	5 or 6	3/8
32	5 or 6	3/8
36	5 or 6	3/8
42	5 or 6	3/8
46	4, 5 or 6	3/8

FLANGED TYPE RIMS

28	5	3/16
32	5	3/16
36	5	3/16
42	5	3/16
46	4 or 5	3/16

Note: Stock from which flanged tires are made to be 1 in. wider than the face of the finished tire.

Tractor Rear Wheels

42	8 or 10
48	10 or 12
54	10 or 12
60	10 or 12

Diameter of holes for lugs and cleats.....11/16 in.
Diameter of bolts for locking cleats..... 5/8 in.

Power Take-Off

The Truck Standards Division recommended for adoption as S. A. E. Recommended Practice for Power Take-Off the recommendation of the Transmission Division on Tire-Pump Mounting.

Referred Back to Sub-Committee

Nominal Tractor Engine Rating

$$\text{Nominal rated horsepower} = \frac{0.7854D^2LRN}{13{,}000} \text{ where}$$

D = piston diameter in inches
L = stroke in inches
R = r.p.m. of crankshaft
N = number of cylinders.

Nominal Tractor Draw Bar Rating

The tractor drawbar rating shall be 50 per cent of the tractor engine (belt) horsepower rating.

If desired, this may be expressed

$$\text{Drawbar rating} = \frac{0.7854\,D^2LRN}{26{,}000}$$

$$\text{Drawbar pull, lb.} = \frac{\text{Rated drawbar horsepower} \times 375}{\text{miles per hour}}$$

Solid and Pneumatic Tire Equipment for Commercial Vehicles*

Front				Rear		
Maximum Size	wt. per truck	Pneu. tire size	Solid tire size	Maximum wt. per wheel	Pneu. Tire size	Solid tire size
3/4	800	33x4 or 35x5	None	1600	35x 5	None
1	1000	34x4½	34x3½ or 36x3½	2100	36x 6	34x 5 or 36x 5
1½	1200	34x4½	34x3½ or 36x3½	3000	38x 7	36x 6
2	1500	35x5	34x4 or 36x4	3500	40x 8	36x 7
2½	1800	36x6	36x5	4000	40x 8	36x 7
3	2000	36x6	36x5	5200	44x10	36x 5D 36x10
3½	2100	36x6	36x5	5700	44x10	40x 5D 40x10
4	2300	38x7	36x6	6500	48x12	40x 6D 40x12
5	2700	38x7	36x6	7800	48x12	40x 6D 40x12

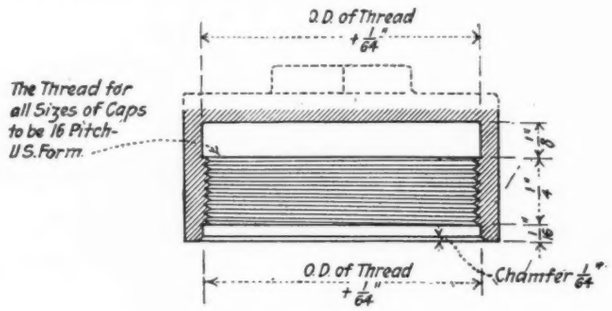
*These data are submitted as general information only as representing good present-day practice.
All pneumatic tires to be of cord construction.

Rejected by Committee

Use of S. A. E. Threads Suggested

Tank and Radiator Caps

Fifteen diameters, all having the same screw pitch, 16 U. S. F., are proposed for standardization, the diameters being, 1, 1⅛, 1¼, 1⅜, 1½, 1⅝, 1¾, 1⅞, 2, 2¼, 2½, 2¾, 3, 3½ and 4 in.

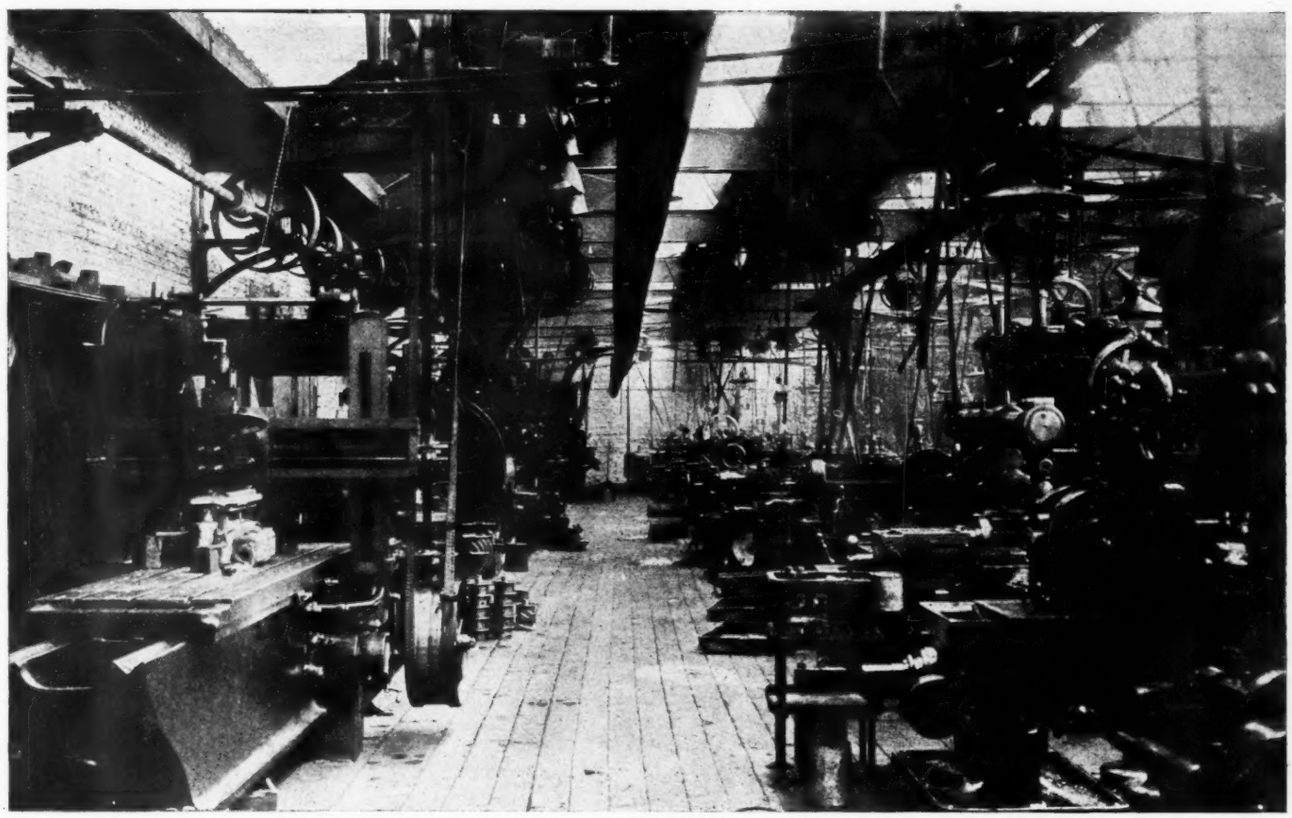


Tank and radiator cap

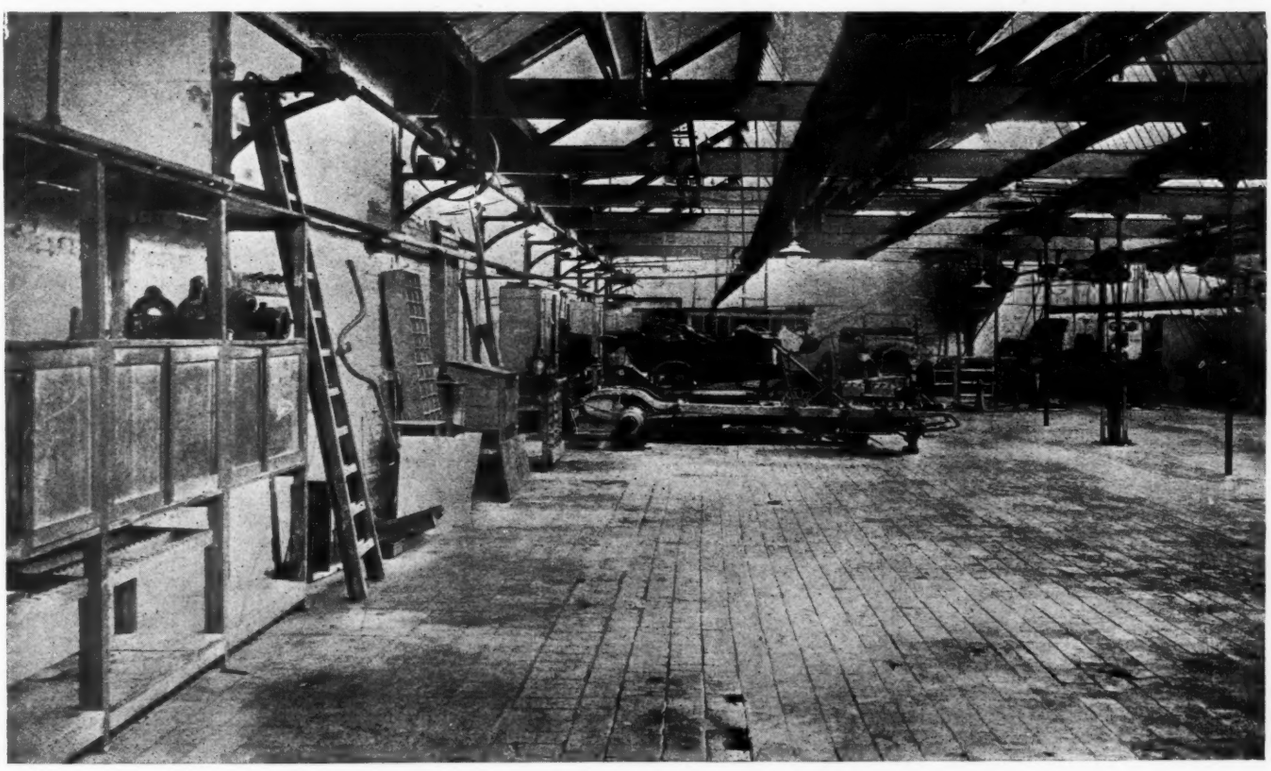
Testing Motorcycle Engines

IN the British motorcycle factory of J. A. Prestwich & Co., Ltd., all engines are given a fan dynamometer test. After the engine has been clamped in position on the test stand by means of two bolts, a chain is fitted on the sprocket wheel on the camshaft from a magneto on an adjustable bed, and the bed is adjusted to give the correct tension to the chain. The gasoline and exhaust pipes are then coupled up to the exhaust pipe leading into a main behind the bed. The final operation is to couple up a Walker fan brake and the starting gear.

How Germans Raided a Belgian Automotive Factory

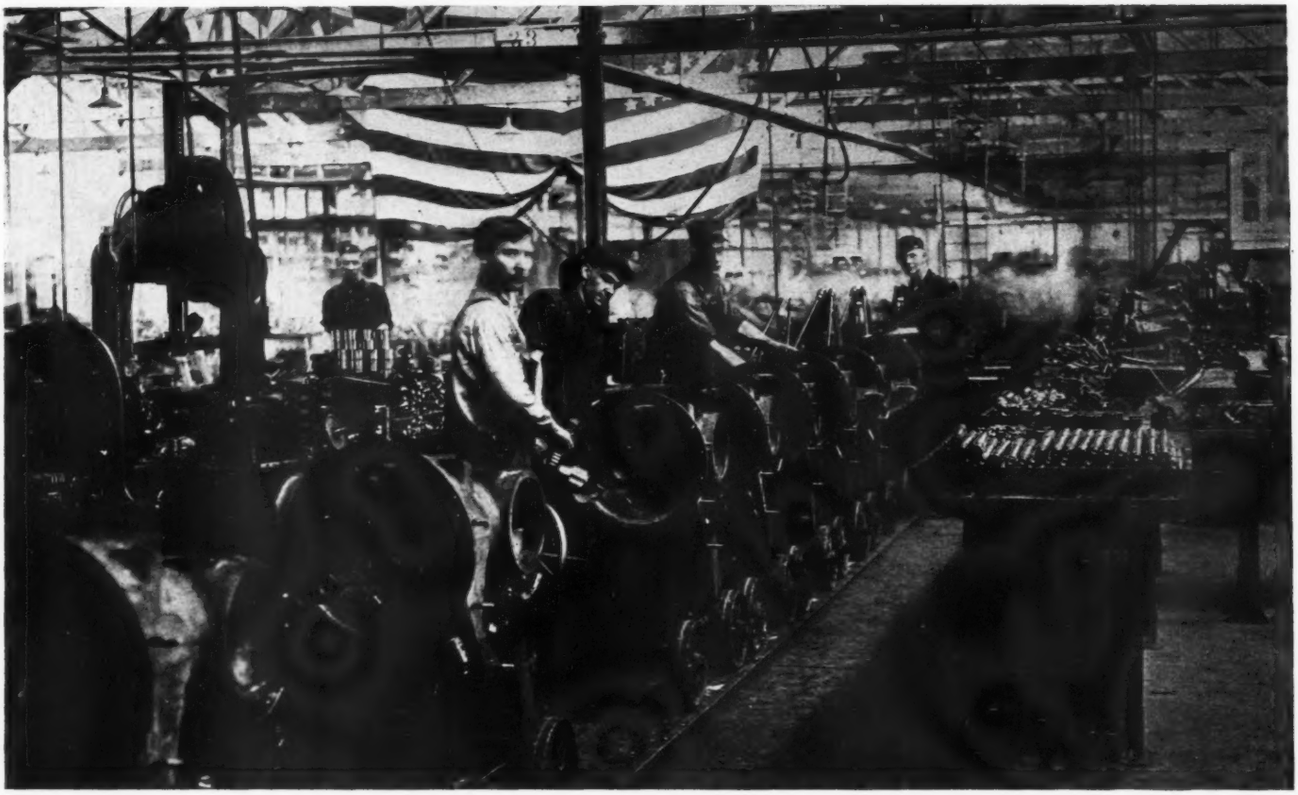


Machine shop of Excelsior factory in Belgium when the war opened

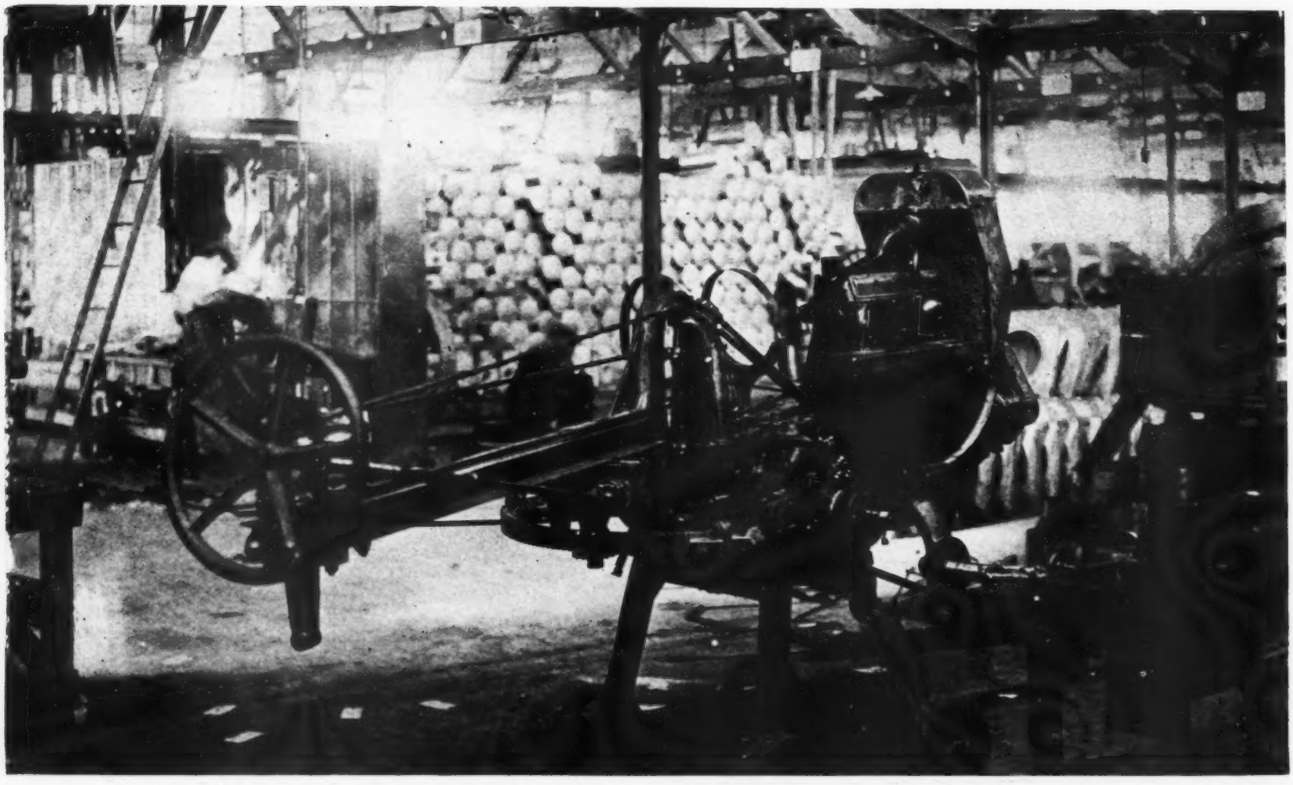


It was a poorly equipped repair shop in November, 1918

In the Moline Tractor Assembly Room



Beginning of the transmission assembly line



Primary assembly nearly completed

Putting the Human Element Into a Tractor Assembly Plan

LAST week Mr. Heldt told how the Moline tractor was produced. This week he tells how it is assembled. There is a thoroughness about the system that suggests an older industry; but, best of all, in two points the human elements are considered—first, in the pay of the men; second, in the daily conferences of the men responsible for the tractor.

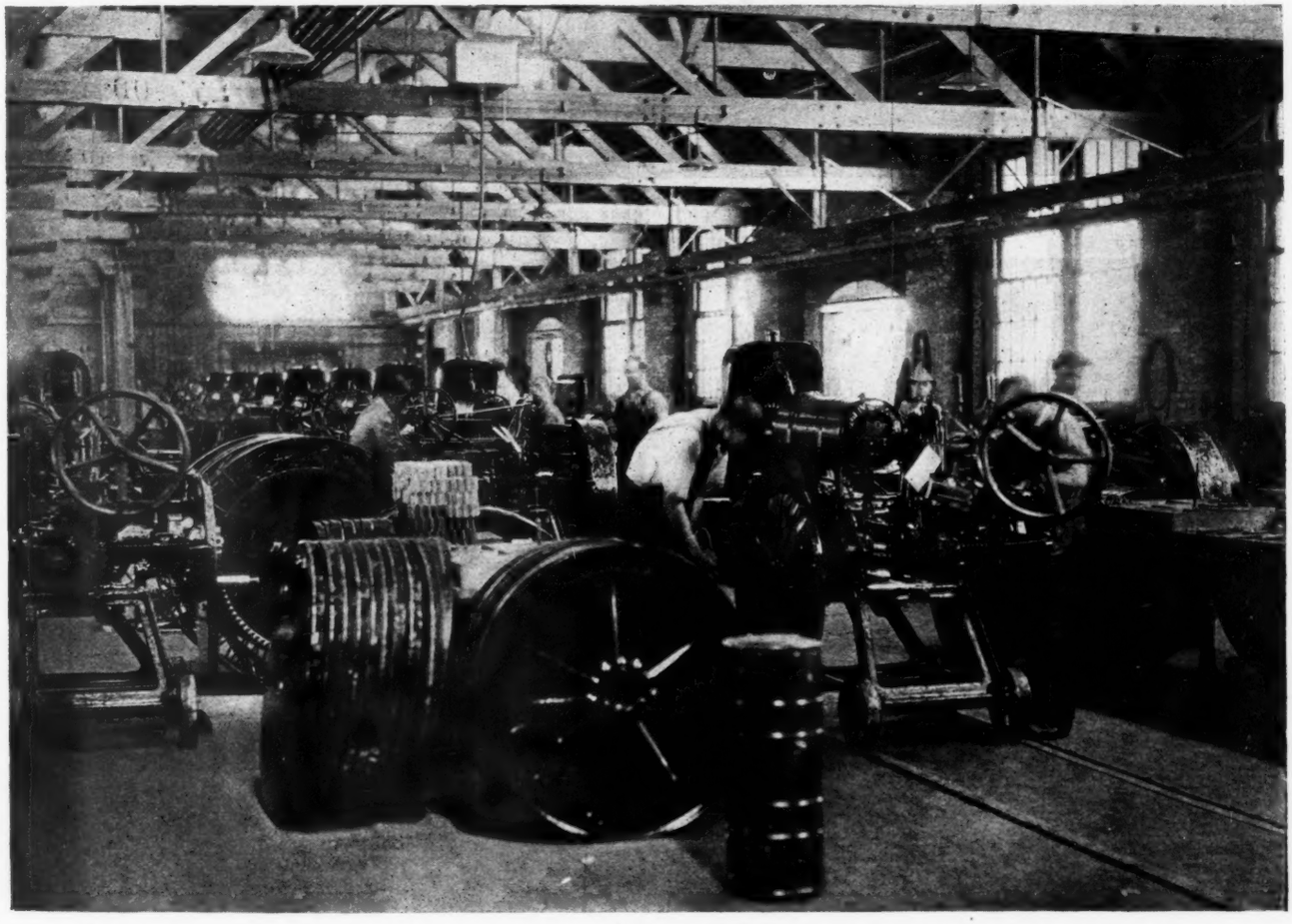
By P. M. Heldt

IN assembling the Moline tractor, first comes the transmission housing, which is placed on a transport truck, made up of two castings, which are bolted together by means of three heavy steel bars. These transport trucks are fitted with four metal wheels, and are of such design that the transmission housing fits to them exactly. The wheels run on the cement floor between guide rails, hence the trucks keep absolutely in line.

In putting in cap screws, use is made of a speed wrench, which consists of a socket wrench with a large flywheel. This flywheel is set to spinning and not only turns the screw to place, but also draws it up with the requisite force.

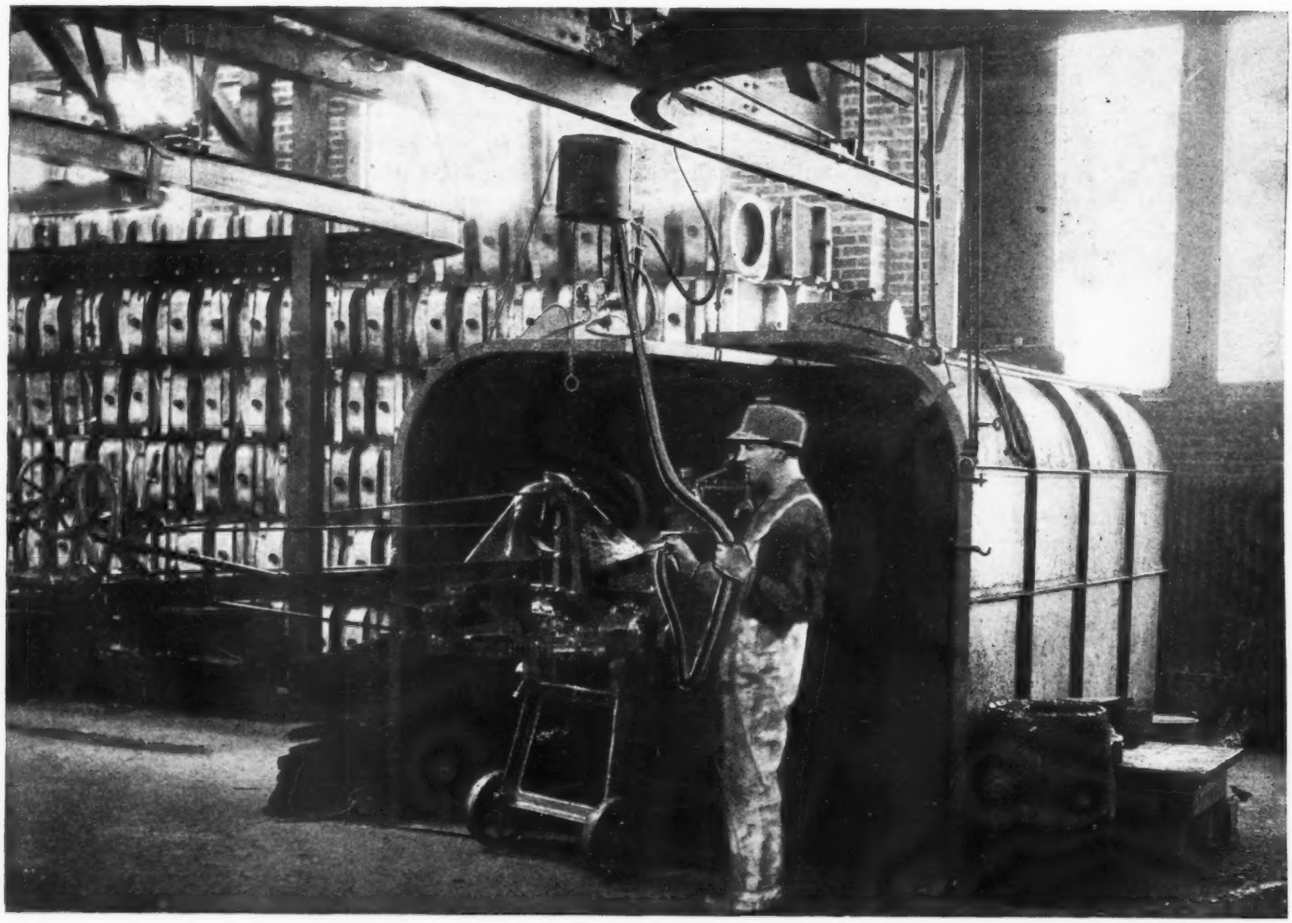
Along the line on which the assembly transport trucks move there are benches, especially designed, to hold the parts that go onto the tractor. Back of these benches there are so-called substations, where small assemblies are made up before they are put on the main assembly.

All assembly work is done on the piece price system. That is to say, a certain sum is paid for assembling each tractor, and the amount due for assembling each week is equally divided among the men engaged in this work. The object of this system is co-operation. While the work is divided among the different operatives as nearly equally as possible, it is impossible to prevent some of the men running behind occasionally with their jobs, and

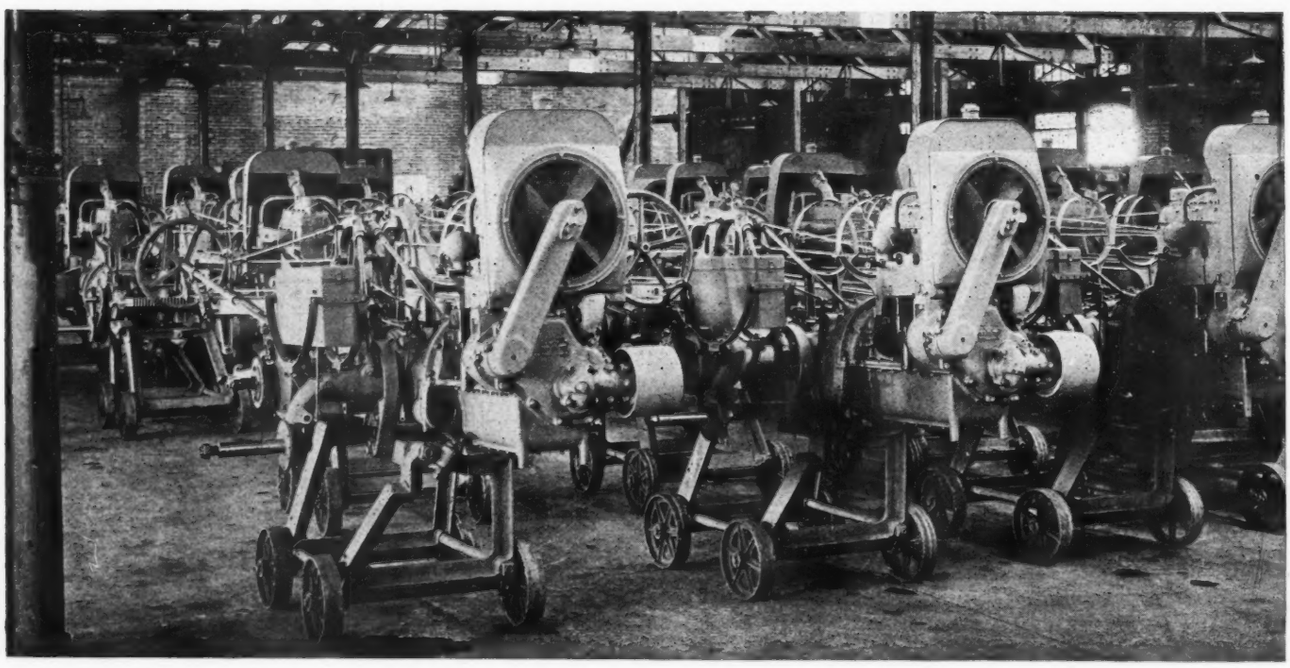


End of final assembly line, showing water box on rafter overhead, with radiator filling hose depending from it

In the Paint Shop



Painting tractor by the spray method

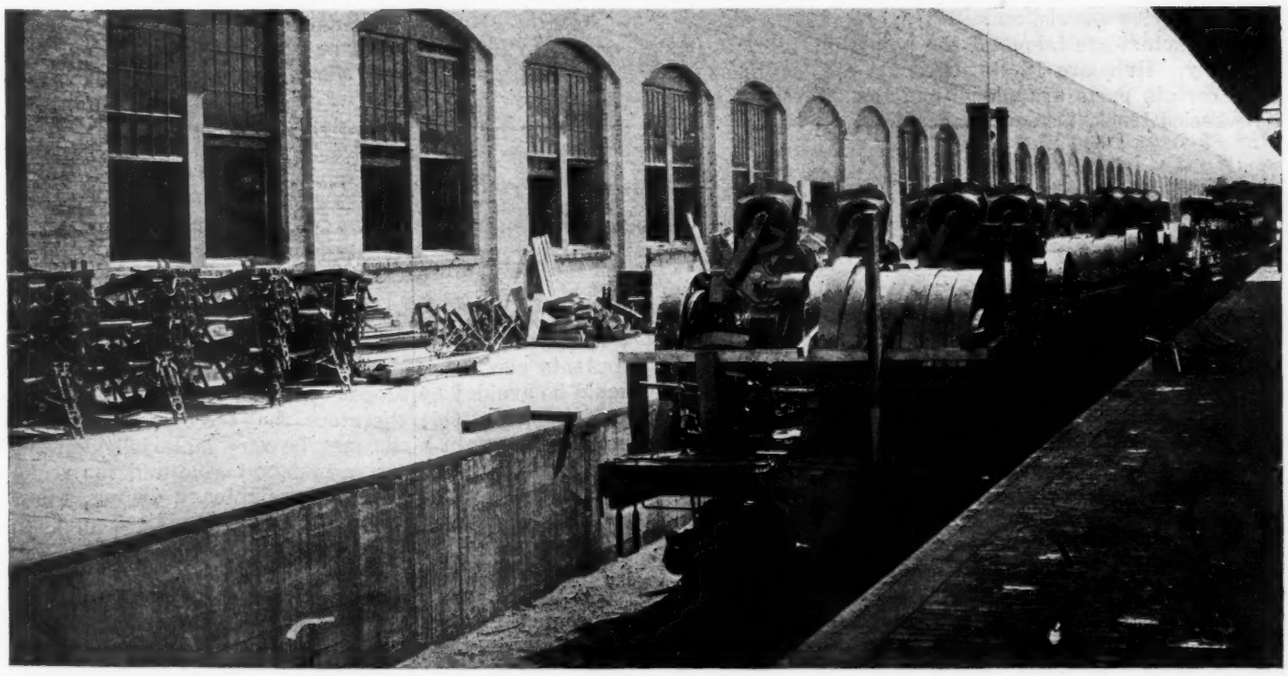


Tractors drying between successive coats of paint

Testing and Loading



A view in the tractor test room



Shipping platform and train of loaded cars. Note that in order to get as many tractors as possible on a flat car, the wheels are removed from the tractors

under this system they will be helped by their "neighbors," so that all keep busy at all times.

The engines and radiators are put on the main assembly at the end of the first assembly line, the engines being conveyed to the line by means of a monorail trolley system.

All engines are thoroughly tested before they are put into tractors, and quite a large testing room is required. At the time of the writer's visit, a considerable addition to the test room was under way, to allow for the increase in production contemplated. At that time there were 39 stands for engine tests in the room. Coal gas is used for making these tests instead of gasoline. The whole scheme of the test room is well worked out, and the latter presents a comparatively clean appearance, being free from the multitude of pipes, wires, etc., which one generally finds in a test room laid down without any prearranged plan.

The water and fuel pipes lie in a trench at the front of the stands, and there is a storage battery back of each stand. Only two pipe connections are required, one for water and one for gas, as the water, after leaving the engine jacket, runs into a trench centrally below the stand, whence it drains into the sewer pipe. There are two kinds of stands in the testing room, one for running in the engines, the other for testing them under power. The engines are started by means of a portable electric motor.

All of the painting is done by means of the air spray. The tractor unit, on its transport truck, stands in the forward part of a spray booth, in the rear of which there is an electrically driven exhaust fan, which draws the excess paint and varnish out through a stack. Two coats of paint and one of varnish are applied.

Owing to the enormous amount of storage space required for air drying, the company, at the time of the writer's call, was installing an oven-drying system, with continuous chain conveyor.

After the tractors have passed through the paint department, they go into the final assembly, alongside of which there is a large stockroom in which are kept such parts as generators, motors, gasoline tanks, strap bolts, nuts, electric wiring, searchlights, battery boxes, carbureters, drive wheels, etc.

The tractors are taken off the paint line into the final assembly. Here are 15 stations. At each of these stations certain parts are added, and then the machine, on its wheeled truck, is moved on to the next station. One of the interesting features of the final assembly department is an arrangement whereby the cooling systems of the tractors can be filled without the use of a floor hose, which is usually very short-lived because of the way in which it is handled, and the use of which is generally accompanied by considerable slopping. A water tank is built on a rafter above the point where the assembly work is completed, and is provided with a flushing valve, so made that when a string is pulled an amount of water exactly sufficient to fill the cooling system is released. The tank, of course, refills automatically.

In one corner of the building, housing the final assembly department, there is a battery room 50 x 60 ft. Among the equipment of this department may be mentioned a water-distilling apparatus which has a capacity of ½ gal. per hr., and a 25-kw. motor-generator set for transforming the charging current. The batteries used on the Moline tractor are of the 6-volt type, and 13 batteries are connected in series for charging in the battery room. All batteries arrive at the plant from the battery makers in the dry state.

After the wheels have been put on the tractor the latter is removed from the transport truck by means of an air hoist, and it is then taken over to the test shed. Here each tractor is given a 5-hr. test under its own power, on a special design of test block. These test blocks are of cast iron and are provided with a wood lining, on which the engine of the tractor slips the wheels. On the opposite side of the building the tractors, after the tests have been completed, receive their final inspection and are tagged.

A noteworthy feature of the organization is the dining room for department foremen and factory heads, in a dwelling adjacent to the plant. It is operated by the company. Here all of the department foremen and factory heads take lunch every day, for which there is no charge. The departments represented here are engineering, accounting and inspection. Among the problems discussed at these gatherings are those pertaining to manufacture, discipline and policy, complaints from customers, difficulties met with in inspection, contemplated shop alterations and improvements, tooling and methods. Topics discussed but not disposed of at one meeting are carried over to the next day. These meetings are presided over by Mr. Keith, the factory superintendent, who calls upon the different foremen to report on subjects pertaining to their respective departments, or on subjects which have been assigned to them.

Gluing Veneer at High Moisture Contents

IT is common practice among plywood manufacturers to dry veneer down to very low moisture contents before gluing it. The object in doing so apparently is to prevent shrinkage of the veneer and consequent marring of the appearance of the finished panel. The drying is done in plate redriers, textile driers or similar apparatus, and adds appreciably to the cost of manufacturing panels.

That such preliminary drying may not be necessary is indicated by the results of a recent investigation by the Forest Products Laboratory. Veneer panels were glued with casein glue at various high moisture contents (some over 50 per cent), and in various tests proved as strong and as desirable as those made under drier conditions. In fact, in the moisture resistance tests a considerable proportion of the veneer which had been dried before gluing showed signs of failure, whereas veneer glued at a moisture content of 15 per cent or higher gave practically perfect results. Panels made at high moisture contents checked if dried too rapidly, but this difficulty could be avoided by proper operation of the kiln.

It seems possible, therefore, that the cost of producing panels of certain kinds may be very materially lessened through the use of water resistant glue and the reduction or even elimination of preliminary drying. Very dry veneer is more likely to break or split than damp veneer; an additional saving is therefore possible through a reduction of waste.

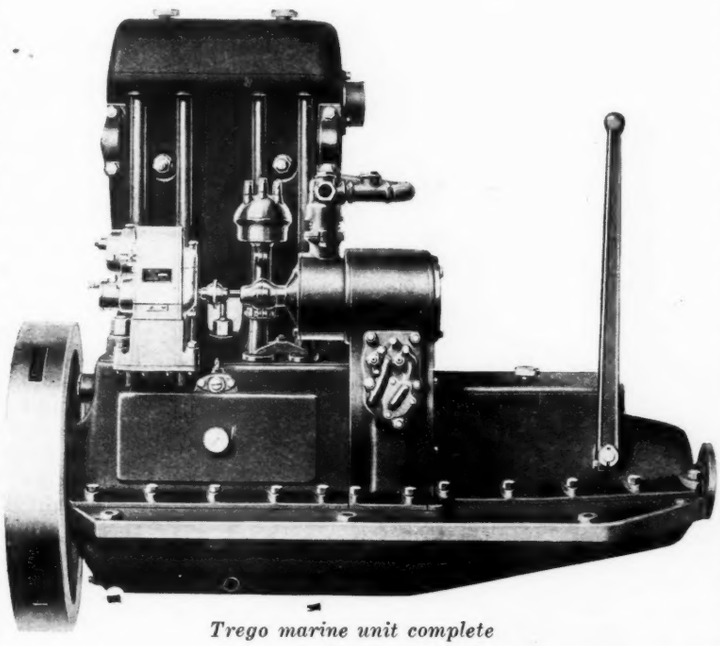
The use of moist veneer, of course, is not practicable for some purposes, but it is quite certain that much of the veneer which is now being painstakingly dried before gluing might advantageously be glued at a higher moisture content.

Novel Features in a Two-Cylinder Marine Set

Engine Is Combined with Reverse Gear in a Single Unit—Complete Inclosure of the Working Parts—Heavy Combustion—Force Feed Lubrication—Bilge Pump, Which Can Be Used as Cooling Water Pump, Is Supplied Extra

A TWO-CYLINDER marine set, comprising an engine and a reverse gear in one unit, is an interesting development. All the components of this set are of very substantial dimensions, and the engine is capable of working steadily under full load. The cylinders are of 5-in. bore and 8-in. stroke, and the engine is rated at 12 hp. at 400 r.p.m. and 25 hp. at 800 r.p.m.

The valve-in-head form of construction is used, which is generally associated with maximum power and fuel economy. One other advantage of this construction is that the entire compression chamber can be machined all over. The two cylinders are made in one casting of vanadium gray iron, and are heat-treated and seasoned. Heavy holding down lugs are cast on the cylinder block, and the studs for these lugs are screwed into substantial bosses in the upper half of the crankcase.



Trego marine unit complete

Both sets of valves are mechanically operated through tappet rods and rock levers, and the entire valve mechanism is completely inclosed and automatically lubricated. The cam followers are of the roller type, and there are long bearing surfaces in the push rod guides, which latter are secured to the crankcase by means of crow-foot clamps. The tappet rods are provided with ball and socket connections at both ends, and there is a simple and accessible adjustment at the upper end.

The entire valve mechanism is lubricated by oil under pressure from the main reservoir, which is forced through the hollow rocker arm shaft to the center of each rocker arm bushing. The surplus oil from these bearings lubricates the springs and other parts, and then returns to the engine base through the tappet rod tube and push rod guide, thus also lubricating these parts. The lubricating oil is carried in a tank separate from the engine, which permits of carrying a larger amount of oil than has been customary in marine installations. This tank is provided with a gage showing the amount of oil it contains. The tank can be filled or drained without disturbing the oil lines or other fittings. The surplus oil, accumulating in the crankcase bottom, is returned by a separate pump to the tank, and all oil is strained three times while making one complete circuit.

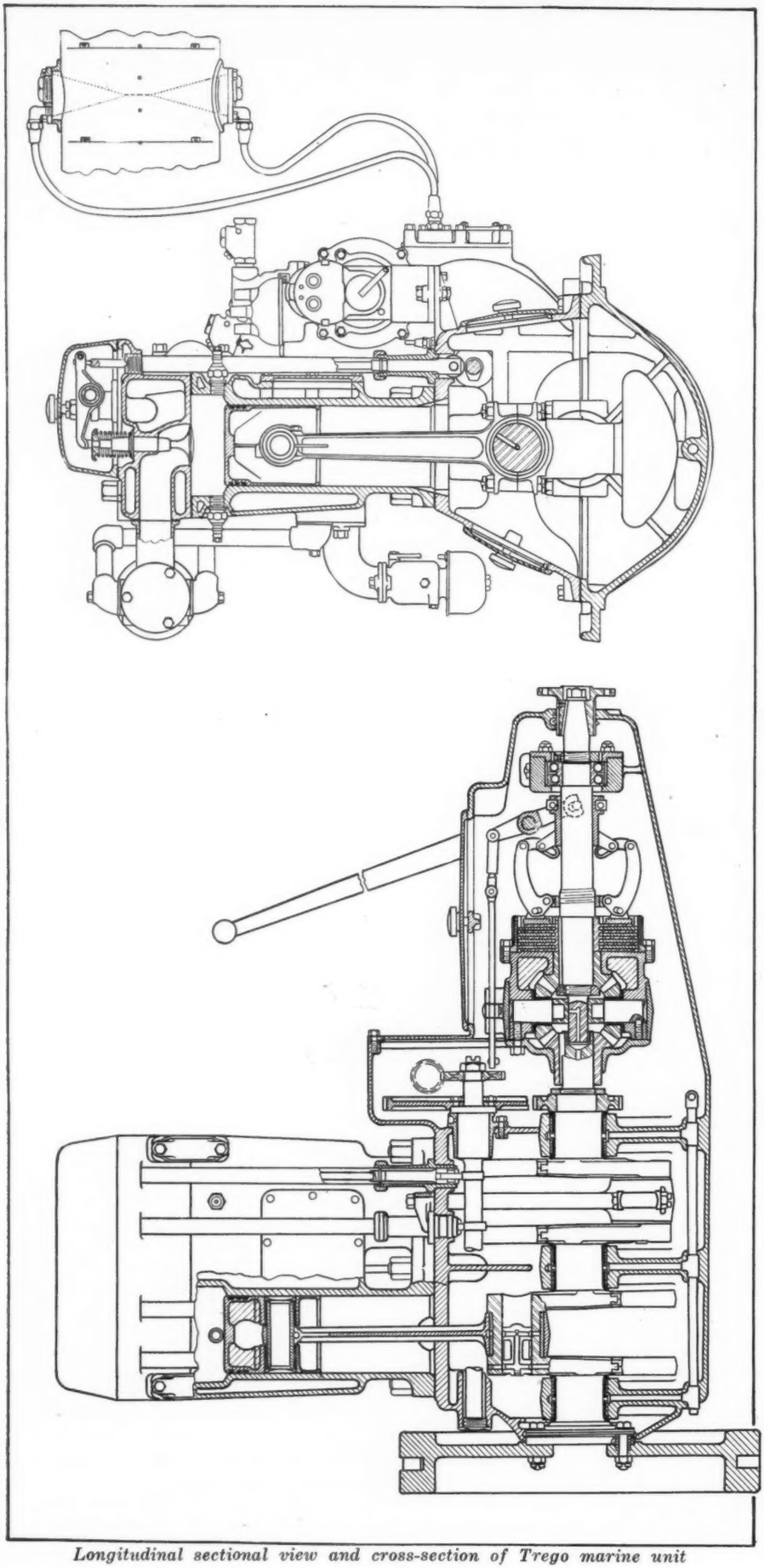
Force feed is used for the main and crankpin bearings, the reverse gear and the valve-operating mechanism, the pressure of feed being regulated by means of an adjustable by-pass valve. Cylinders, camshaft bearings and gears, distributor shafts and gears, water pump and accessories are lubricated by spray from the crankpin bearings. In addition to the main oil pump, which feeds oil under pressure to the main bearings, there is an auxiliary pump, which returns the surplus oil to the tank, and both pumps are combined in one assembly and can be instantly removed. An oil pressure gage, adapted to be mounted on the steering wheel, is furnished with the set.

The cylinder head is removable, which obviates the necessity for valve cages, and insures more thorough cooling of the valve seats. Cooling water is carried from the cylinder jacket to the head jacket through by-passes bolted to the sides of the cylinder blocks. This obviates the necessity for ports in the cylinder head gasket. The cast iron exhaust manifold is fully water jacketed. The inlet pipe is inclosed within the cylinder blocks, whereby a uniform temperature of the mixture entering the cylinder is insured for all seasons of the year. A kerosene attachment, which is said to give very satisfactory results, can be supplied as an extra.

There is a large hand hole on the water jacket, which permits of cleaning out the jacket and also serves to prevent injury to the cylinder castings by a freeze up, as the cover plate is of light material.

Before entering the cylinder jacket the cooling water is circulated through the jacket of the exhaust manifold, thereby greatly reducing the volume of the exhaust gases, and cutting down back pressure and noise.

A bronze plunger-type water pump is employed, the working parts of which are fully inclosed and lubricated



Longitudinal sectional view and cross-section of Trego marine unit

by splash, a dipper on the eccentric shaft dipping in the oil.

As an extra, the Trego Motors Corp., the manufacturer, also makes a bilge pump, which is a duplicate of the cooling water pump, and can be used for the purpose of the latter in an emergency. This bilge pump is provided with a clutch, operated by a hand button, and therefore operates only when required. All water piping is of brass, and all connections are of the flange and bolted type, the water inlet and outlet being both ¾-in. pipe sizes.

The pistons are made of gray iron castings, with 8 radial ribs inside, designed to distribute the heat. Three piston rings are fitted above the piston pins, and there are also a number of oil grooves on the piston. The piston pin, which is 1¼ in. in diameter, is made of steel, hardened and ground; it is securely locked in the connecting rod, and rocks in two bronze bushings secured in the piston bosses. Each bushing has an effective bearing length of 1 9/16 in. There are oil pockets in the piston bosses over the bearings. Conventional drop forged I-section connecting rods are used. The crankshaft is of very substantial design, and is fully counter-balanced. All main and crankpin bearings are of bronze, babbitt-lined, the dimensions of each bearing being 3 x 3 in.

Two sizes and weights of flywheel are furnished, 19½ in. and 23 in. in diameter respectively. These wheels are bolted to an integral flange on the crankshaft, the bolt passing through hardened steel dowels. The flywheel is located at the forward end of the power unit.

A single camshaft is used, which has the cams forged integral with it. The bearings of this camshaft are of extra large size, and are lubricated by oil caught in pockets directly above them. Gears with helical teeth are used for driving the camshaft.

There are large hand holes in the upper half of the crankcase. The latter is made of gray iron. The handhole plates are held in place by thumb nuts and are easily removed, whereupon access may be had to the main and crankpin bearings.

The lower half of the crankcase, which is made in one piece with the reverse gear extension, is also of gray iron. This casting is provided with a strong projecting ledge on either side, provided with heavy bosses for holding down bolts, and arranged with an oil trough to insure cleanliness. The crankcase is so designed that the bed timbers can be carried continuously from the bow to the stern, without interfering with the flywheel, except that when the 23-in. flywheel is used the bed timbers must be notched.

The reversing gear is of the Trego company's own design, and is of the bevel-gear type, employing heat-treated nickel steel gears. The tail shaft telescopes into the crankshaft, the latter being provided with a bronze bushing.

A multiple disk type of clutch is used, and is provided with a single nut adjustment and positive lock. The clutch is thrown in and out by a hand lever fitted to the outer end of a cross shaft. The entire reverse gear is completely inclosed, and runs in oil, which is forced outward from the center of the bearing by means of the oil pressure pump. There is a large handhole plate on the reverse gear housing, which can be instantly removed by unscrewing a single pump nut.

A double-thrust ball bearing is mounted inside the reverse gear housing, and runs in oil. There is a forged steel coupling with male and female members at the rear end of the reverse gear.

A standard float-feed carbureter is fitted, and the engine is furnished with two independent ignition systems, a high-tension inclosed waterproof type magneto and a battery system provided with waterproof boot. There are two spark plugs in each cylinder head, in water-cooled bosses.

Lively Discussion of Dr. Pogue's Fuel Paper

(*Continued from page* 1431)

to specify the b.t.u. per cubic foot, rather than the candle hours, is coming into use.

Road oil, which has been used in large quantities to lay dust, also contains some of the lighter fractions suitable for motor fuel.

How much fuel is wasted by incomplete combustion was illustrated by the remark that there had been cases in which forty per cent dilution had been found in crankcase oil after 200 miles driving.

Taking up Hinkley's request for the stabilization of fuel characteristics, Dr. Pogue said the situation was similar to that of a naval gunner who said he could make a hit all right if his own ship could be stopped and the enemy ship, forming the target, could also be compelled to stop. Fuel will always change and automotive engineers will have to shoot from a moving base at a moving mark.

Hugo Gibson suggested that if the fuel research committee has any funds at its disposal, it should set aside a certain sum for the development of a device for producing a combustible gas from the heavier hydrocarbons. He pointed out that the heavy fuels must be heated slowly and must not be over-heated, and this would call for the use of a thermostat to by-pass any excess heat.

Mr. Horning, who said he had attended every meeting of the fuel research committee, informed the meeting that the committee would be able to tell the character of the fuel to be marketed a year or two in advance. He depreciated the policy of furnishing alarming statements regarding an impending fuel shortage to the press.

First, because there was no ground for alarm during the present generation;

Second, because we are just beginning to apply remedial measures which may change the situation.

He said the only thing the public should be told was to use fuel economically.

Fuel Problem Prominent in the Truck Discussion

(*Continued from page* 1435)

The discussion was opened by H. L. Horning, general manager of the Waukesh Motor Co., who told of some experiments made to improve the fuel economy of a certain 5-ton truck. This truck was loaded to 8 tons and then run at a speed of 18 m.p.h. "to stimulate normal operating conditions," Mr. Horning said, jestingly, over a stretch of road 16⅛ miles, containing various classes of pavements and hills up to 9 per cent.

On the first trip 8 miles of gasoline were consumed. After some adjustment of the carbureter were made the run was repeated and the gasoline consumption reduced to 7 gallons. The truck had been fitted with a vacuum fuel feed and this was eliminated. Another saving of fuel was made on the next trip. Next a combination manifold was applied, which heated the charge, and this resulted in cutting the fuel consumption down to 5½ gallons. The fuel tank in the last experiment was located rather high and by bringing it to a lower lever this fuel consumption was reduced to 5 gallons 1 pint which was improved to 5 gallons ½ pint by very close adjustment of the carbureter.

Next the compression was lowered to sixty pound and kerosene was used as fuel 5 gallon 1½ pint being consumed on the 16⅛ mile run.

Mr. Hale of the Goodyear Tire & Rubber Co., gave some information on that company's experience with pneumatic tired trucks. They usually put a 5-ton truck power plant into a 3½-ton truck. This had a bearing on the formula presented in Mr. Kalb's paper and Mr. Hale counseled truck designers that, whatever results were arrived at by formula, they should be checked by comparison with practical results. The Goodyear Company has 5 trucks running without a differential on the rear axle and, although they have been in service for quite some time, no difference was noted in tire wear as compared with trucks having a differential.

Asked by Joseph Husson regarding the tire mileage obtained with the Goodyear company's pneumatic tired-trucks in service between Akron and Boston, Mr. Hale said that while he could give no definite figures the mileage was not very satisfactory, was due to the fact that the trucks were driven night and day by alternate drivers and the 750-mile trip was made practically without stop.

In the Canton-Cleveland service, where the roads are well paved and there are no hills, a mileage of 10,000 to 12,000 is obtained from 10-inch tires, which are still in the development stage and 15,000 to 20,000 from eight-inch tires. The company uses a 2-ton truck equipped with a 3½-ton power plant and pneumatic tires and loads it to 3½ tons.

Going to Advertise Abroad? Practice on Cuba

IN THESE days when so many American firms are trying their wings at export business there are many experiments to be tried. Our goods first went abroad because the other countries needed them? Now we have competition. If our merchants are to hold the trade against the before-the-war favorites they must advertise and create a demand.

This is an experiment which each merchant must try for himself. Here is some helpful advice, with the main facts set forth.

CUBA is a fine place to try out an export selling advertising campaign. Advertising abroad is a new field for a good many American firms and most of those who go into it will have to learn by experience. There are a number of reasons why Cuba may be the laboratory for this experiment.

One point, the Island is comparatively small and a campaign will not be as expensive as in larger countries. Another reason is that the Cubans are friendly and a mistake will not be as disastrous as in more critical countries. Finally, there are considerable data to guide the advertiser in Cuba.

So now, while European markets are practically closed to our automotive merchandise, the manufacturers must look elsewhere for an export market. Naturally they turn to Latin-America, where the first task is to create an American market of the demand that once was supplied by European manufacturers. This must be done by advertising. The Latin-American countries do not regard advertising as this country does, so the advertiser must learn new ways.

Cuba is essentially a Latin-American country. It is the nearest and the most friendly. It is more accustomed to American ways. So why not get the experience there?

Preparation for Campaign

But an advertising campaign in Cuba—or any other country—must not be undertaken without preparation. Unless complete investigation precedes the advertising, the money will be a waste. The value of Cuba as the "tryout" for American advertising to Latin America and the methods for such advertising are described at length by Trade Commissioner J. W. Sanger of the Bureau of Foreign and Domestic Commerce, Department of Commerce, in a bulletin describing advertising methods in Cuba. This pamphlet is the first of a series which will deal generally with advertising in all of the important Latin-American countries.

In his general description of the Cuban market, Mr. Sanger points out that the language of the island is Spanish and a knowledge of Spanish is essential for the transaction of general business, although many business men understand English and the latter language is taught in the schools.

Cuba is on a gold standard basis and its monetary system is modeled on that of the United States. The metric system is in general use, but other units are common. Postage rates between Cuba and this country are the same as our domestic postage. Mail distribution is prompt and the remote districts are reached by reasonably good service. Telegraph and telephone lines operate comprehensively. The population of Havana, which is the most important business center, is 95 per cent Latin and 75 per cent of its total business is in the hands of Spaniards.

American influence and business practices are gaining an increasing grip here, but business is generally conducted in a small way and is basically Latin in organization. Fixed prices are the exception and generally the price paid depends on the patience and shrewdness of the shopper.

The daily papers published in Havana are, practically speaking, the only island-wide media for news and advertising, says Mr. Sanger. There are no weeklies or monthlies similar to the American publications. The dailies carry considerable Cuban advertising, often crude and not always in good taste or truthful. Few American trade marks are known. No goods are asked for by name or brand, nor are prices displayed or advertised.

The leading merchants of Havana are almost unanimously of the opinion that the "bargain sales" methods of the United States would be useless in Cuba. They assert that native women, particularly, are not careful buyers. The natives buy for to-day and disregard to-morrow. Consequently offering of a quantity at a reduced prices does not appeal to them, because they can't use the increased quantity at one time. The Cuban woman is not the head of her home, as is the American woman.

Advertising in the Island comprises copy for the trade and for the consumer. The demarkation between the two is not always clear. Mr. Sanger found that consumer advertising frequently brings increase from the trade and vice versa.

American Export Journals

The use of American export journals printed in Spanish is approved by Mr. Sanger, who says that when these publications gain the proper standing they are used by the Cuban dealers as catalogs. Many manufacturers who have never had personal representation in foreign fields have received orders from advertisements in export journals. Because a number of export journals are of a questionable character, he suggests that advertisers should first inquire into the circulation of each issue in each Spanish speaking country, method of obtaining circulation, class of readers, affiliation with the Audit Bureau of Circulations, if

papers are sent in bulk or individually, source of the editorials and news articles, and if "write-ups" are permitted in the editorial pages, before buying space.

Personal letters, folders, small catalogs, etc., are freely used throughout the Island, not only as a means of reinforcing campaigns, but often as the main substance of the campaign itself. Sales letters from America should have the appearance of being written individually, must be courteous and friendly, yet should not take on that degree of familiarity used in this country. Familiarity implies lack of dignity and an ignorance of the proprieties to the Latin American. The letters should be signed individually and the higher the title of the signer the better. Under no circumstances should letters be marked, "dictated but not read," or "signed in the absence of."

Properly prepared catalogs have a value that scarcely can be overestimated in creating prospects, preparing the ground for salesmen and for aiding merchants to duplicate their orders. American merchants have used catalogs in Cuba successfully. A courteous, personal letter in the same mail with the catalog is important and aids a friendly reception. Not only Spanish, but idiomatic Spanish, should be used, and not the "so-called correspondence school Spanish," which Mr. Sanger states the Latin American "politely endures." Single catalogs sent by mail are not subject to customs duties, but printed matter in bulk, intended for distribution by the dealer, must pay Cuban tariff.

Havana daily newspapers are equal, mechanically, to American papers. Both the daily and Sunday editions are excellent mediums. They are well edited and compare favorably in appearance and text with papers published in the same size cities in the United States. The explanatory word "advertisement" is not required by law at the bottom of advertising reading notices, neither is a distinctive type used and, as a consequence, many papers carry paid items disguised as news. Cuban papers are willing to carry free publicity in connection with advertising.

The population of Havana is 400,000 and should support two morning and two evening papers, whereas thirteen dailies struggle for the circulation among a limited number of readers. The best papers in Havana, according to Mr. Sanger, are the El Mundo, Diario de la Marina, La Discusion, La Lucha and Heraldo de Cuba. These five dailies fairly well cover Havana, which means that they cover Cuba.

Copy Adapted to Conditions

Cuban copy must be written to conform to the Island idioms. It must be pictorial and it must portray enjoyment of emotions whenever possible. The "common sense copy" or the "reason why copy," common in the United States, finds little response in Cuba, excepting in the advertising of articles distinctly technical in nature. Cuban women do not read newspapers and take small part in home, club, civic or national affairs.

The necessity for giving full consideration to climate and social conditions is emphasized by Mr. Sanger, who cites, for example, the advertisement of an American manufacturer of cleaning wax for automobiles, in which the illustration pictured the man of the house and his wife deeply interested in cleaning their car. In Cuba, the work is done by the chauffeur or in a public garage. Even the cheapest automobiles are driven by chauffeurs, and the owner exerts no appreciable influence as to the kind of cleaning fluid or polishing wax used.

The free and easy, friendly and intimate copy much used in American advertising would be misunderstood and, in fact, regarded as impudent in Cuba. It is also well to remember, states the bulletin, that "United States" is preferable to the use of America or American, because America frequently means all of the two continents in the Latin-American countries. Coined words used as trademarks or trade names are not always advisable. They may be unpronounceable in Spanish or have a distinctly unfortunate meaning.

The Cuban has an almost Oriental tendency to speak and act indirectly. He talks and writes at great length. He will never make a plain answer of "No." His method is more courteous and roundabout. His tendency is not to be scientific or mechanical. He is less analytical than the Anglo-Saxon, and more easily impressed by an attractive picture. He is impressionable and likely to act on impressions; consequently a picture or illustration, indirect and simple, unhampered by technical arguments or "reason why" copy, is the surest to appeal to him.

Methods of placing advertising in Cuba vary. It can be done through Havana advertising agencies, through the local sales agents or dealers, or through United States advertising agencies. The latter has been found the best by Mr. Sanger. Advertising through local dealers is likely to produce waste. As a rule the dealers have no knowledge of advertising practice. The advantage of dealing through the Havana agency includes translation, placing of business, check of insertions, adjusting differences between publishers and advertisers and final settlement. These agencies, however, make no effort to analyze American conditions nor give the valuable co-operation extended by American advertising agencies. The more progressive American agencies have thoroughly analyzed the Cuban market, employ men who not only speak Spanish but know the Cuban idioms, habits and customs and are, consequently, to be preferred.

Practically all of the motion picture houses display advertising slides. The average theater is not open during the day, but has performances from 7 p. m. to midnight. Fees charged are from ten cents to twenty cents. There are no organizations in Havana through

When Advertising Abroad:

Remember that advertising is more highly developed in this country than elsewhere.

Study closely the people and the country you would reach.

Do not be imposed upon by mere translators.

Write your copy for and at the particular people you would reach.

Beware of local superstitions.

Study local prejudices as to pictures and colors.

Never translate an American advertisement; write local ones.

Advertising is not an international art, but always a national one.

UNVEILING THE SALMSON ENGINE MYSTERY

THE Salmson engine! You remember hearing much about it during the war. You heard, you well recall, that it was the only French engine that proved to be entirely satisfactory for airplane use. But you did not hear what you wanted to know about this engine. To most of us on this side it was a war mystery.

But the mystery is dispelled. W. F. Bradley, the European Correspondent of AUTOMOTIVE INDUSTRIES, *has lifted the veil. He has sent to us a comprehensive set of pictures of this engine and a technical description. He tells about the "water-cooled cylinders mounted around a single crankcase" and other outstanding features. Mr. Bradley was familiar with the performance of this engine before the war and he knows its history as well as its mechanical features. His article, with the pictures, will appear in an early issue.*

which advertising slides might be placed and it is necessary to make arrangements with each theater separately. The rates have not been standardized. Practically all of the motion picture houses in Havana are well patronized and screen advertising should be as effective as in the United States. There is an excellent opportunity for the use of motion picture films rather than slides.

Street car advertising in Havana cars is controlled by a New York firm. In addition to this card space in the cars, every street car in Havana carries advertisements in colored glass across the top of the windows, which can be read from the outside only.

Poster and painted-board advertising exists only in Havana, where its volume equals that of similar cities in the United States. This offers excellent opportunities for the use of pictorial copy. The colors should be the primary ones, the treatment simple and strong, and with the trademark reproduced in the same colors as the automobile.

Electric signs, hand bills, calendars and novelties can also be used to advantage. Because of the climate, the average store window is arranged for comfort rather than display purposes. The fronts of the stores are formed by rolling iron shutters. But often in these stores, cut-outs, signs and other advertising can be so placed that it attracts the passerby. Some of the newer class stores have plate glass windows.

In Cuba the rights of propriety in trademarks are derived entirely from the law and depend entirely on the registration of the mark and, once registered, its ownership is fixed for 13 years. The cost of registration is $12.50, with renewal at the same price. If a new trademark is selected for special use in the Latin-American countries, it is wise to select one that is easily pronounceable in all languages. Spanish has certain pecularities. It has no letter "W" and seldom uses the letter "K".

The greatest simplicity in trademark design is advised, and the design should be colored effectively. Mr. Sanger recommends registration of the trademark in every Latin-American country at the beginning of the export business. An International Bureau for trademark registration at Havana has been established. The payment of $50 obtains registration for the trademark in all of the countries represented in the Bureau.

Summarizing, Mr. Sanger declares Cuba is the logical "first point of attack" for any contemplated Latin-American advertising campaign. It is buying American goods in increasing quantities every year, is exporting most of its products to the United States, is a close geographical neighbor and is friendly to this country.

Small packages of engraving matrices or printed matter can be sent from the United States to Cuba without payment of duty. Copper electrotypes are dutiable at the rate of 20 cents per 2.2 lb. Duty is based on gross weight with a tare allowance of 13 per cent for cases and 5 per cent for other ordinary receptacles. Articles not especially mentioned, including type and electrotype of zinc or lead, are dutiable at 15 cents per 2.2 lb. Wooden electrotypes are dutiable at 25 per cent ad valorem. In each case the duty from the United States is one-fourth less than from all other countries.

Appendix attached to the bulletin includes a list of all of the publications, daily, weekly and monthly, in Cuba.

The following table shows the tariff numbers, the general rate of duty, and the rate for United States goods, on various articles of interest to advertisers:

Tariff No.	Articles	General rate	Rate on United States goods
		Per 100 kilos.	Per 100 kilos.
155	Books, bound or unbound, and similar printed matter (gross weight)	$1.625	$1.30
157	Pictures, lithographs, chromolithographs, oleographs, etc., printed from stone, zinc, aluminum, etc., used as labels, flaps, bands and wrappers for tobacco or other purposes:*		
		Per kilo.	Per kilo.
	a. 1 to 3 printings, including bronze (bronze printing counted as 3 printings) but not metal leafwork, other than maps and charts	$0.065	$0.0455
	b. 4 to 7 printings, inclusive, not including any metal leafwork, other than maps and charts	.26	.182
	c. 8 to 13 printings, inclusive (not metal leafwork), other than maps and charts	.52	.364
	d. More than 13 printings, including all metal leafwork, other than maps and charts	1.04	.728
		Per cent	Per cent
315	Chromolithographs for advertisements, provided the advertising renders them unfit for other purposes, ad valorem	32.5	26
345	Lithographs, posters, manufacturers' catalogs, calendars and folders for advertising purposes only, having no commercial value and intended for free public distribution	Free	Free

Articles classified under No. 345 are those only which have no commercial value, such as advertisements in the cheapest form, presented in small quantities. Those which come as an ordinary importation of merchandise or as part or the whole of an invoice and manifested consignment are dutiable under the appropriate tariff numbers. Articles excluded from No. 345 on account of having commercial value shall be classed under No. 315, unless dutiable as printed matter.

*Duty based on gross weight with tare allowance of 10 per cent for cases and 3 per cent for other receptacles.

Are You Considering

INDUSTRIAL REPRESENTATION?

IF you are, here is something well worth your reading? It is the fearless plan adopted by the Goodyear Tire & Rubber Co., with an introductory statement by Mr. Tipper, who has been making a study of this industrial development. No employer can afford to ignore this question to-day.

By Harry Tipper

FOR some time articles in these columns have noted progress in the adoption of plans calling for industrial representation in the factories in the automotive field and other fields. One of these plans which has several new points of significance is the plan adopted by the Goodyear Tire & Rubber Co. and was reported fully by them in the last issue of their publication.

It will be seen that this plan, for the first time in any industrial plan for joint consideration of working conditions, differentiates between executive powers and legislative powers as required in the industrial organization.

Those who have been following the articles which have been appearing in AUTOMOTIVE INDUSTRIES upon the subject of industrial organization, with particular reference to the human relations, will remember that one article, in the issue of Dec. 5, was devoted solely to the exposition of the two fundamental necessities in all human organizations—those required to govern the operating or executive functions of organization and those required to deal with the legislative necessities.

This fact has been recognized to some degree in political organization, but it has not received the attention it deserves in connection with industry, and it is vaguely understood by many manufacturers who confuse the machinery for legislative purposes with the machinery for executive or operating purposes. This is seen in the constant fear, before the average manufacturer, that legislative machinery will eventually assume operating control.

It will be noticed that the first two provisions of the Goodyear plan, which is given in detail here, differentiates carefully and clearly between the executive powers and the legislative powers. The wording of the first paragraph, in relation to executive powers, is thoroughly in accordance with the requirements of orderly industrial organization and carries into the plan the sense of the paragraph in the article printed in AUTOMOTIVE INDUSTRIES of Dec. 5, which states:

> "The operative functions require continuous decision, supervision and obedience to that supervision. They require the lodgment of large powers in the governor or leader and an equally large measure of acquiescence in those who are subject to the government."

It will be seen that the plan of the industrial representation is in all respects, as far as its operation is concerned, modeled upon the political plan which is contained in the Constitution of the United States.

It will be noted also that in Clause 9, the House and Senate by a two-thirds majority can pass a ruling or regulation for the factory over the veto of the factory manager. This is an interesting departure and is along the lines of the veto provision adopted by William Filene & Sons a number of years ago.

In paragraph 8 of the regulations is a provision allowing a bill to become a factory regulation within 30 days if the factory manager fails to sign it, so that no demand of the House and Senate can be permitted to die by inaction.

An additional feature of this plan, which is out of the ordinary, is indicated in paragraph 13 in the requirement of an oath of office. It has been found valuable in all government work and in all positions of public responsibility to require of the participants in that responsibility solemn agreement to the general provisions under which they are to work. The character of the oath in this case seems to be of the right kind and the demand upon the representatives and senators to agree to the provisions stated, by taking oath thereto, is only in accordance with public practice which has been justified by long experience.

YOU CANNOT AFFORD TO MISS THIS!

MANY questions are being asked regarding the program of the radicals of labor and the reasons for their apparent ease in turning unrest to their advantage.

These questions indicate that there is a great deal of interest in this particular development and next week Mr. Tipper's article will deal with the program of the radicals, their methods of working and the way in which they have used the prevailing unrest to further their purposes.

INDUSTRIAL REPRESENTATION PLAN

Proposed by the Council of Industrial Relations of the Factory of The Goodyear Tire & Rubber Co., Akron, Ohio

This Plan of Industrial Representation is unanimously approved by the Council of Industrial Relations, comprised of the following:

P. W. Litchfield	E. S. Rose	B. W. Waugh	D. R. Stevens
O. P. Kidder	E. Hartman	C. McClister	C. Slusser
H. D. Hoskin	F. B. Campbell	H. O. Allman	W. C. State
C. R. Johnson	F. H. Fuller	H. Grow	Wm. Stephens

THE Council of Industrial Relations, composed of representatives elected by Goodyear men and women, foremen elected by Goodyear foremen, and executives appointed by the Goodyear factory management, after having thoroughly considered the subject of industrial representation for securing justice to both men and management through co-operative methods has evolved the following plan for industrial co-operation at Goodyear, and presents this plan to Goodyearites in the sincere belief that its acceptance by management and men of the Goodyear factory will prove beneficial to all.

PLAN
For Akron Factory of The Goodyear Tire & Rubber Co.

1. Executive Powers.

All executive powers for operation of the Goodyear factory shall be vested in the management, and shall not be abridged in any way except in accordance with the legislative powers granted in this Industrial Representation Plan.

2. Legislative Powers.

All legislative powers granted in this Industrial Representation Plan shall be vested in an Industrial Assembly of the Goodyear factory which shall consist of two (2) houses, namely, a Senate and a House of Representatives.

3. The Industrial Assembly.

The Industrial Assembly shall be composed of forty (40) Representatives and twenty (20) Senators, elected by the Industrians of the Goodyear factory, who shall meet separately or jointly, on the first Monday in each month in Goodyear Hall. Representatives shall be elected for one year and Senators shall be elected for two years.

Each Representative and each Senator shall have one vote.

Each House shall vote independently of the other.

Each House shall determine rules for its proceedings and shall keep a record of its proceedings.

4. Unit of Representation—Precinct and District.

The Goodyear Factory shall be divided into forty (40) precincts. Precincts shall be determined so as to include substantially an equal number of people, and with due regard to departmental classification of the factory.

Each precinct shall have the right to elect one Representative.

The precincts shall be further arranged into groups of four, and each group shall be named a district, and each district shall have the right to elect two Senators.

5. Method of Election and Recall of Senators and Representatives.

Election of Senators and Representatives shall be held in the Goodyear Factory annually on the second Monday in October by secret ballot, and the Assembly shall be convened on the first Monday in November. At each annual election there shall be forty Representatives and ten Senators elected, except in the first election, when there shall be twenty Senators elected.

A Representative or Senator may be recalled on petition signed by two-thirds of the voters in his precinct or district, and approved by two-thirds of the House of which he is a member.

Upon severance of employment with the company, a Representative or Senator shall immediately and automatically cease to hold office.

6. Qualifications of Representatives and Senators.

No person shall be a Representative who shall not have attained the age of 21 years and who shall not be an Industrian of Goodyear, and not have had one year's continuous service record in the factory immediately prior to date of election.

No person shall be a Senator who shall not have attained to the age of 25 years, and who shall not be an Industrian of Goodyear, and not been in good standing on the pay roll of The Goodyear Tire & Rubber Company for five years, the last two of which shall have been a continuous service record immediately prior to election.

If vacancies in the seats of Representatives or Senators happen by resignation or otherwise, the one who shall have received the next highest number of votes from the precinct or district in which the vacancy shall have occurred shall fill the vacancy.

7. Qualifications of Voters and Definition of Industrian.

A Goodyear Industrian must be 18 years of age, must be an American citizen, understand the English language, and have a six months' continuous service record in the Goodyear Factory immediately prior to election. Each Goodyear Industrian is entitled to vote. [CONTINUED ON NEXT PAGE]

Industrial Representation Plan

[CONTINUED FROM PRECEDING PAGE]

8. Power and Procedure of The Industrial Assembly.

The Articles of Incorporation of The Goodyear Tire & Rubber Company and the laws of the State of Ohio fix the final authority and responsibility for management of the company in its Board of Directors. Therefore, subject only to the right of the Board of Directors to veto or annul, the power of the Industrial Assembly shall be as follows:

The Industrial Assembly shall have legislative power to make changes in Factory Rules and Regulations which from time to time have been or shall be made by the management as provided in Article 1, on the subject of wage adjustments, working conditions, and the adjustment of grievances in accordance with the following procedure:

Every bill which shall have passed the House of Representatives and the Senate, shall, before it becomes a Factory Rule or Regulation, be presented to the Goodyear Factory Manager. If he approves, he shall sign it, but if not he shall return it with his objections to the House in which it shall have originated, who shall enter the objections at large upon their record, and proceed to reconsider it. If after such reconsideration two-thirds of that House shall agree to pass the bill, it shall be sent, together with the objections, to the other House, by which it shall likewise be reconsidered, and if approved by two-thirds of that House it shall become a Factory Rule or Regulation. But in all such cases the votes of both Houses shall be determined by yeas and nays, and the names of the persons voting for and against the bill shall be entered on the record of each House respectively. If any bill shall not be returned by the Factory Manager within thirty days (Sundays excepted) after it shall have been presented to him, the same shall be a Factory Rule or Regulation in like manner as if he had signed it, unless the Assembly by failure to provide proper means to receive it shall prevent its return, in which case it shall not be a Factory Rule or Regulation.

9. Approval and Veto Powers of the Factory Manager.

Every order, resolution, or vote, to which the concurrence of the Senate and House of Representatives may be necessary (except on a question of adjournment) shall be presented to the Factory Manager of the Goodyear Company, and before the same shall take effect shall be approved by him, or being disapproved by him, shall be repassed by two-thirds of the Senate and House of Representatives according to the rules and limitations in the case of a bill.

10. Joint Conferences.

On matters of joint interest to men and management, such as wage adjustments, working conditions, and the adjustment of grievances, Joint Conferences may be called where representatives of the men meet an equal number of representatives of the management. Frequent conferences are desirable for the consideration of constructive suggestions of mutual interest.

11. Joint Conferences, How Formed.

The Industrial Assembly shall appoint six (6) Industrians, three from the Senate and three from the House of Representatives, and the Factory Management shall appoint six (6) Industrians to meet as a joint conference. Persons thus selected shall be duly accredited representatives of the Goodyear factory men and management for consideration of and co-operation upon subjects of mutual interest. The Industrial Assembly shall maintain standing committees composed of three members of each house to facilitate quick action in securing a joint conference.

12. Industrial Representation Plan — How Amended.

The Industrial Assembly whenever two-thirds of both Houses shall deem it necessary shall propose amendments to this Industrial Representation Plan, which shall be valid to all intents and purposes as a part of this plan when approved by the Factory Manager. In case amendments have been passed by a two-thirds vote of both Houses over the veto of the Factory Manager, such amendments must be approved by the Board of Directors of The Goodyear Tire & Rubber Company before becoming valid.

13. Oath of Office.

Before entering upon his duties, each Representative or Senator shall take and subscribe to the following oath, which shall be administered by any officer empowered to administer oaths under the laws of Ohio: "I solemnly swear (or affirm) that I will faithfully support the Constitution and laws of the United States and the State of Ohio and the Industrial Representation Plan of The Goodyear Factory, and that I will to the best of my ability faithfully and conscientiously discharge the duties incumbent on me as a Representative (or Senator) under such plan."

14. Guarantee Against Discrimination.

There shall be no discrimination against any Goodyearite on account of membership or non-membership in any labor organization, or against any Representative or Senator for action taken by him in performance of his duties as outlined in this Plan.

15. Industrial Representation Plan—How Ratified.

This Industrial Representation Plan shall become effective when a majority of the Industrians of the Goodyear Factory and the management of the Goodyear Factory shall have authorized the present Industrial Relations Council to place their signatures hereon.

AUTOMOTIVE INDUSTRIES
THE AUTOMOBILE

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United States and Mexico - One Year, $3.00
Canada - One Year, 5.00
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Subscriptions for the Horseless Age transferred to the subscription list of AUTOMOTIVE INDUSTRIES in the merging of the two publications will be completed in full by the weekly issues of AUTOMOTIVE INDUSTRIES to the dates of expiration shown on the records of the Horseless Age Co.

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How to Reach Congress

AMERICAN manufacturers are to-day aware of the needs of industry for constructive action by Congress to promote business along the new lines. Especially is this true of manufacturers who are entering the export field. The needs have been stated recently at conventions and are developing from day to day in business experience.

Never before has there been so great a need for clean-cut co-operation between industry and Congress. There are problems of railroad transport, marine transport, tariffs, commercial aeronautics, parcel post, and numerous other subjects, none of which can be solved by business without Congressional action and none of which Congress can properly handle without the advice of business.

But individual protests, criticisms or suggestions, sent singly and at spasmodic intervals, to the legislators at Washington are wasted energy. The Congressional Record prints daily petitions of this character, read into the Record by a Congressman, clipped and sent to the petitioner whose only satisfaction is reading his protest in print.

When the farmers set out to have the day-light law repealed, they did not employ such haphazard methods. They used concerted efforts. When labor wants legislation, members of unions do not write individual letters. Labor's demand is made through organization. And industry vitally in need of legislation—a legislation important to the entire public—must work concertedly with Congress to gain its end. Congress heeds popular demand. Popular demand is the employment of concerted effort.

Patent Office Needs

THE Patent Office Society has recently entered the lists of those seeking publicity. This society was organized by employees of the U. S. Patent Office with a view, according to the society statement, of improving the service of this office to those seeking patents and those using patents—or rather it might be put to the honest persons in these two classes. One of the important objects is to make possible more certain profit to the inventor and better protection for the legitimate buyer of a patent.

With these worthy objects in view, the society has published some exceedingly interesting pamphlets. One of these tells the history of the U. S. Patent Office and another tells of the legislation that the society members think is needed to carry out their objects.

The history of the patent office is an important document. It reviews briefly the patent history of the colonies, but the story really begins in 1790, when the first patent statute was written. Patents were placed under the care of the Secretaries of War and State and the Attorney General. Thomas Jefferson, as Secretary of State, was a member of that first board, and it is testified from the handwriting in the record books that Mr. Jefferson was a very active member.

By degrees the statutes were changed until the protection thrown around the inventor was fairly complete and then, the pamphlet says, the patent laws of this country began to attract attention of the world. The writer says that "all of the civilized nations of the world, save one, have modeled their patent laws after those of the United States."

There is an interesting bit of history in that part of this story which reviews the influence of inventions on the history of the country. The climax of this story is quoted from an Englishman, Sir Robert A. Haffield, himself a noted inventor, who tells of a conversation with a Japanese statesman. The Japanese told Sir Robert that when the leaders of that country set about making their country great, they looked up the history of the great companies and found that the United States had made the most rapid and substantial growth. They analyzed this development and concluded that it was due to "patents." So Japan modeled her patent laws after the United States.

This story, as told by the Society of the Patent Office, leads up to the great objective; that is—to get certain legislation passed by Congress. This proposed legislation is outlined as follows:

(1) The establishment of a single Court of Patent Appeals to take over the appellate jurisdiction now lodged in the nine independent Circuit Courts of Appeal.

(2) The establishment of the Patent Office as a separate institution independent of the Department of the Interior.

(3) An increase in the personnel of the Patent Office to enable it to render prompt and efficient service and an increase in the salaries to approximate those paid in outside patent work so that qualified examiners may be kept in the public service.

(4) A change in the law relating to damages in infringement suits to answer one of the most common and strongest reproaches against the patent system, namely, that a patent does not ordinarily pay the inventor any money.

Certainly no group has better reason to ask definite and well defined patent legislation and practices than the automotive industry. Patents are the vital factor in the present manufacture and in the advancement of the industry.

The object of this presentation of the subject is to interest the men of the industry in the U. S. Patent Office, so that they will investigate its needs and help to define a policy that will make for as great a scope of usefulness as is possible. We commend the publications of the Patent Office Society as a good place to begin this study.

Supply and Demand

THE material situation is rapidly getting back to a supply and demand basis. Since 1917 the market has more or less been controlled by the Government and even where this control has not been directly exerted, it has had a marked influence on the market. We are now practically free from any form of Government regulations and as a result the market is seeking its own level. Conditions more nearly approach an open and free market than they have since the war really got under way.

During the stage of readjustment to actual purchasing conditions, there are going to be sharp fluctuations, or, what amounts to the same thing, wide differences between purchase prices of material of a similar nature brought from different sources. This will soon readjust itself, however, and while prices can be expected to remain high, due to the placing of large orders, nevertheless the buyer has more of an opportunity to shop than he has had for four years. Taken as a whole, industry may be said to really welcome the return of the buyers' market. Conditions were extremely difficult during the period when the market was entirely on the sellers' side.

One important result is sure to be longer time buying, which ought to have a steadying influence on the market.

Cost of Tractor Plowing

THE complete cost of tractor operation involves a good many items, such as interest on investment, depreciation, etc., which it is difficult either to determine accurately for a given period or to apportion properly to the acre of ground plowed. However, two of the chief items of cost—at least if there is plenty of work for the tractor so that the pro rata fixed charges are low—are labor and fuel. In a recent demonstration at Delavan, Wis., these two items of cost were determined, and the results arrived at are interesting as throwing some light on the question of how the cost of plowing varies with the size of the machine used—that is, the number of plows pulled.

The great majority of the tractors demonstrated were three-bottom machines, and the figures of cost arrived at for this type may therefore be regarded as a good average of what may be expected. In the other classes the number of individual machines was smaller, and the average cost figures therefore do not bear quite so much weight. Each outfit was operated by one man. In estimating the results, labor was figured at 60 cents per hour, kerosene at 12.7 cents per gallon and gasoline at 23.7 cents per gallon.

One thing that tends to prevent a logical comparison of the different classes on the basis of cost per acre plowed is that some of the machines ran on gasoline, which costs about twice as much per gallon as kerosene. Both of the tractors in the single bottom class burned the more expensive fuel, as did one of the four tractors in the two-bottom class.

As might be expected, the cost of plowing decreases as the size of the machine used increases (if only the items of labor and fuel are considered), the average cost figures for the four sizes of machines demonstrated being as follows: Single-bottom, $2.67 per acre; two-bottom, $1.20 per acre; three-plow, $1.14 per acre; four-plow, $1.12 per acre. The very large difference in the plowing cost between single-bottom and two-bottom tractors and the comparatively slight difference between the cost with the other tractors are explained by the fact that both single-bottom tractors used gasoline for fuel, which practically doubled their fuel cost, while, on the other hand, most of the two-plow tractors plow at considerably higher speed than the rest, which tends to keep down the labor cost with them. These two factors, one forcing the single-bottom plowing cost up and the other the two-bottom plowing cost down, are together responsible for the wide gap between the two figures.

There is one rather peculiar item in the published data of the demonstration. These data are arranged in tabular form and the last column of the table gives the fuel and labor cost per acre per bottom. This means that the fuel and labor cost per acre, which is undoubtedly the factor that most interests the farmer, was divided by the number of bottoms used—for what reason it is hard to conjecture. The quotients thus obtained are certainly without any practical value.

Summer Meeting at Ottawa Beach Pleases Engineers

Entertainment Vies with Discussion in Attracting 800 S.A.E. Members and Families

Fuel Situation Given Prominent Attention, Dr. Pogue's Paper Leading Open Talk

OTTAWA BEACH, MICH., June 26—As a climax to the program of entertainment and recreation arranged to lighten the technical side of the summer meeting of the Society of Automotive Engineers, 800 members and their associates, with the wives and families of many, witnessed or took part to-day in the field sports. With the cares of the wartime period laid aside, the engineers entered heartily into the day's events and into the tournament that began on Monday and will continue until the final session to-morrow.

Division of the meeting into sections gave virtually unlimited opportunity for discussion of papers, at the same time adding to the hours of pleasure and sociability, of which the members and their companions took full advantage. The Lake Michigan resort, combining water and shore life and offering an endless variety of amusements, proved popular with the visitors, who patronized in large numbers the golf courses, tennis courts and ballrooms, also "seeing Michigan," in a limited degree at least, in tours over the automobile highways.

As a means of entertainment, along with practical demonstration, E. H. Colpitt, assistant chief engineer of the Western Electric Co., talked to the engineers and their guests on the wireless telephone, coincidentally putting the apparatus into operation between the auditorium and a motor boat a mile and a half off shore. A sound intensifier had been installed, and the audience heard the conversation between the lecturer and the boat crew, which was followed by an exchange of questions and answers between the boatmen and persons in Chicago, part of the way over a wire circuit.

Mr. Colpitt reviewed the development of the wireless telephone and discussed its future use, at the same time stating its limitations.

Under the sectional plan, the members found the technical papers grouped logically, with opportunity for informal discussions intended to assist the development of the various branches of the industry. There were spirited sessions on the passenger car and motor truck situations, with large attendances.

Keenest interest was shown in Dr. Joseph E. Pogue's fuel paper, and the discussion following it emphasized the necessity of concerted action to insure a continued supply and to make available advance information regarding impending changes in its character. It was felt that the action of the automotive and fuel industries in naming a committee jointly to study the problem would dismiss tendencies toward panic over the situation, and prove of assistance to engine and carbureter designers who must know in advance the fuel which their products must be made to utilize. The meeting room was crowded during the discussion.

The standards committee's meeting on Monday resulted in submission of a considerable number of proposed standards and recommended practices to the society.

Following the custom of previous meetings, section reports were printed and distributed to members in advance of the time set for their consideration, facilitating discussion and voting.

DAYTON-WRIGHT SOLD

WASHINGTON, June 24—Attempts made yesterday in Congress to prevent the purchase of the Dayton-Wright Airplane Factory, Dayton, Ohio, for $3,260,000, which was appropriated last week in the Army appropriation bill, were defeated. The sum appropriated will buy the factory and adjoining land, which includes 1586 acres. The factory and land will be used as an Air Service Engineering Experimental Station.

REO PLANS EXPANSION

LANSING, June 22—The Reo Motor Car Co. is breaking ground for a new machine shop, 200 x 514 ft., containing 132,518 sq. ft. of floor space. This is the first step of an expansion program which will revolutionize production and increase the pay-roll by 1500 men. The completion of this program will occur in the fall. A part of the building will be 3 stories high while the rest will be 2 stories. When this building is completed the motor building department will be moved to the former truck plant. It is the plan to build engines complete.

BETHLEHEM IN MERGER

NEW YORK, June 24—Formation of a company under the laws of Delaware, to purchase the stock of the Bethlehem Motors Corp., Allentown, Pa., and the North American Motors Co., Pottstown, Pa., is announced.

The new company, which will have an authorized capital of 130,000 shares of stock of no par value, is headed by Arthur T. Murray, with D. G. Dery, S. C. Potter and H. B. Hall, vice-presidents; treasurer, Martin E. Kern, and secretary, M. H. Deary. Allan A. Ryan, recently chosen head of the Stutz Motor Car Co. of America, is one of the directors.

A report of the new company after refinancing shows: Cash in banks and on hand of $1,494,188; notes receivable, $29,301; accounts receivable net, $293,227; notes payable, $868,757; accounts payable, $184,291; common stock, no par value, and surplus, $3,393,966, and total assets and liabilities of $4,466,039.

Plan to Build Up S. A. E. Membership

Society to Seek Out Unenrolled Among 20,000 Prospects—President's Address

OTTAWA BEACH, MICH., June 24—The question of future membership came up prominently in the business session of the S. A. E. summer meeting last night. By C. C. Hinkley's report for the membership committee it was shown that the roster on June 1 contained 4,045 names of all grades, a gain of 772 during the last year. It was stated that there were almost 20,000 eligibles in the country, and plans to recruit these prospective members were discussed.

The present membership includes 4,045 members of different grades, 99 offiliated members of different grades, 99 affiliated point was raised as to the advisability of limiting the section associates in proportion to the number of full members of each section. This question is a result of the rivalry of the Metropolitan and Detroit sections. There was a difference of opinion as to whether a section associateship should be limited to one year or two years.

The treasurer's report, read by Coker F. Clarkson, showed a balance of $128,281.99.

G. P. Dorris of St. Louis, C. C. Hinckley of Detroit, and W. H. Conant of Cleveland were made members-at-large of the nominating committee to serve with members from the sections in arranging at once for organization.

A summary of the standards committee report, as read by A. B. Bachman, was adopted, making all the material in the issue S. A. E. standard, subject to ballot of the membership.

David Beecroft reported for the meetings committee that the large number of reservations for the summer session, aggregating 750, had dictated choice of the Ottawa Beach meeting place, which he characterized as likely to prove satisfactory, despite some disadvantages. Charles M. Manly, president of the society, declared, in his annual address, that opportunities and obligations facing the automotive industry called for earnest devotion of talents and energies, particularly to solve problems connected with the resumption of peace.

Of the future of the industry, Mr. Manly said:

"In the subdivision of automotive engineering work having to do with motor trucks, the real work of the engineer has hardly as yet been begun. True it is that motor trucks are being sold and are daily hauling thousands of tons of merchandise and general freight, but the careful study and collection of data for accurately pre-determining the best operating equipment, organization and personnel to meet given conditions at a definitely predetermined cost has hardly been started. This single phase of automotive engineering presents more problems for the engineer

(*Continued on page* 1461)

French Automotive Restrictions Lifted

Cars, Tires and Parts May Be Exported Freely—New Ad Valorem Surtax Applied

WASHINGTON, June 23—The restrictions against the importation of automobiles, tires and parts have been lifted by France and these commodities can now be exported from the United States to that country freely. This information was received officially by the Department of Commerce here to-day.

It is expected by Government officials here that Great Britain, as a result of France's action, will also remove restrictions in the near future and allow automobiles to be imported from the United States.

Information also received by the Department of Commerce provides for a new ad valorem surtax, based on c.i.f. or landed values at French customs houses. Twenty per cent ad valorem is the extreme limit of the surtax under the minimum and 40 per cent ad valorem under the general tariff. The amount of surtax to be applied to pamphlets could not be learned here, but it is anticipated that regardless of the tax, automobiles will be ordered in great quantities.

Although it is not known in Washington just what plans the Liquidation Office of the American Expeditionary Force has formulated for the disposition of the motor trucks and cars in France, it is understood here that the removal of the motor restrictions will allow the taking over of trucks and cars by the original manufacturers if they so desire, and if the War Department should consent to the resale of these trucks and cars to consumers in France upon payment of the French duties. It is also possible, under the new regulations, that the War Department may sell trucks and cars to consumers in France upon payment of French duties. What disposal will take place has not been determined.

France has decreed that all trucks and cars sold to consumers for use in France by the American Expeditionary Forces will entail the payment of the French duties, but if these cars and trucks are sold in France for use outside of French territory, there is no necessity for payment of French duties.

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Another View

PARIS, FRANCE (*Special Cable*), June 20—From date automobiles weighing a minimum of 5511 lb. can be imported into France on pre-war duties, plus an ad valorem tax of 20 per cent maximum and 10 per cent minimum. The rate on tractors is 40 per cent maximum and 20 per cent minimum.

Automobile parts are now admitted on a pre-war basis plus an ad valorem tax varying from 20 to 30 per cent per ton to 15 per cent minimum, according to the nature of the article. The decree covering these changes does not especially mention touring cars, and while the situation as governing these is obscure, it is believed that they are still subject to 70 per cent duty.

Pre-war French duties on all automobiles were 70 francs general and 50 francs minimum per hundred kilos.

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The foregoing is a reproduction of a cablegram received from W. F. Bradley, special representative of AUTOMOTIVE INDUSTRIES in France. It seems to indicate that the new ruling applies to trucks, as the minimum weight limit of 5511 lb. obviously is too great to affect the majority of passenger cars. As a kilogram equals 2.2046 lb. it is apparent that the new French ruling applies to vehicles in excess of 2500 kilos.

The restrictions mentioned in the Bradley cable are not noted in the cables received by the Department of Commerce at Washington from the commercial official attache at Paris. These official cables make no mention of weight restrictions but, as told in a dispatch from Washington on this page, indicate that all restrictions except duty have been removed. The Department of Commerce, when informed of the cable from Bradley, undertook to verify it, but at time of publication a reply had not been received from Paris.

PROPOSED SAXON PURCHASE

DETROIT, June 25—At the meeting of Saxon creditors called for to-day, a proposed purchase plan of the Saxon Motor Car Corp. will be outlined, according to information gained from an official of the company. No details are available for publication at this time. Should the deal go through, it is understood that Saxon financial interests would be in a strong position, and all creditors will receive payment in full.

MASSACHUSETTS AMENDS BILL

BOSTON, June 23—The Massachusetts truck and trailer bill, which caused so much protest because of its prohibitive fees, was amended June 12, passed in the House and is now in the Senate. The bill, as amended, materially reduces fees for the larger size trucks, but they still remain nearly three times the present fees. Fees for capacities over 7 tons probably relate to trailers as the law in this state prohibits gross weight in excess of 28,000 lb. This schedule, as applied to trailers, is still prohibitive.

The amended schedule follows:

Before Amendment, Capacity		After Amendment, Capacity	
1 ton or less	$10	1 ton or less	$10
Over 1 ton to 1½ tons	15	Over 1 ton to 2 tons	20
Over 1½ to 2 tons	20	Over 2 to 3 tons	30
Over 2 to 2½ tons	25	Over 3 to 4 tons	40
Over 2½ to 3 tons	30	Over 4 to 5 tons	50
Over 3 to 3½ tons	40	Over 5 to 6 tons	60
Over 3½ to 4 tons	50	Over 6 to 7 tons	70
Over 4 to 4½ tons	75	Over 7 to 8 tons	80
Over 4½ to 5 tons	100	Over 8 to 9 tons	90
Every additional ½ ton	50	Any capacity over 9 tons	100

Rules for French Show Next October

Regulations Received by N.A.C.C. Place American Exhibitors at Disadvantage

NEW YORK, June 25—The National Automobile Chamber of Commerce has received application blanks and regulations governing the International Automobile Show to be held at the Champs Elysées October 9 to 19.

Applicants are required to agree not to enter any other show in France before 1921, a prohibition which would stand against American exhibitors participating in an American exposition in France. To be rated on a par with the French, foreign exhibitors must have shown at three previous French exhibitions and be from countries imposing no greater than 15 per cent import duty prior to 1914.

On the latter provision, the N. A. C. C. says: "This places American exhibitors at a disadvantage, for the inference is that some provision will be made for them only after the others are cared for."

There will be 12 classes of exhibitors: Automobiles and chassis complete, motor trucks and buses, engines, etc., bodies and their parts, automobile dealers (established at least six months), bicycles and motorcycles, tires and tubes, accessories and parts makers, accessories parts dealers, forges and furnaces, sporting goods, automobile schools.

Plan to Build Up S. A. E. Membership

(*Continued from page* 1460)

to solve than if all of our records and data were suddenly swept away in railroad transportation engineering and it became necessary to immediately re-establish such data for the determination of proper freight rates.

"Similarly, in that newest of the branches of automotive engineering, which is destined to grow to be one of the biggest of the brothers in the family of giants spring from the union, under the magic influence of the electric spark, of atmospheric air and petroleum in the internal combustion engine, the commercial operation of aircraft, the scope and importance of the problems that must be given immediate and careful attention and study by the engineer are so great that I venture the prediction that within the next ten years there will be a larger number of engineers engaged exclusively on them than there are to-day in the total membership of this society."

FACTORY ADDITIONS

PORT HURON, MICH., June 21—Work on the first new unit of the Holmes Foundry Co. is well under way and will be completed by July 1. A new foundry plant is nearing completion at the United Brass & Aluminum Co. This plant is also building a large storehouse.

Goodyear Industrial Plan Put in Effect

Organization Follows Lines of National Legislature—Will Regulate Factory Conditions

AKRON, OHIO, June 24—Voice in the management of the Goodyear Tire & Rubber Co. has been given its employees by a new industrial representation plan. At a special election Monday, 92 per cent of the workers voted for it. The plan as outlined by the Council of Industrial Relations at the factory follows the lines of the national and state legislatures.

Executive powers are vested in the management, and legislative powers in the Industrial Assembly consisting of a House and Senate. The House is composed of 40 members and the Senate of 20, all elected by the workers. Members of the assembly are elected for 1 year, and members of the senate for 2 years.

An assemblyman must be not less than 21, and in the continuous employ of the company for not less than 1 year. A senator must be not less than 25, and in the continuous employ of the company for not less than 5 years. They may meet separately or jointly on the first Monday each month. Each representative and each senator has one vote.

A representative or senator may be recalled on petition signed by two-thirds of the voters in his precinct or district, and approved by two-thirds vote of the house of which he is a member. Upon his severance of employment with the company, a representative or senator automatically ceases to hold office.

Voters must be not less than 18, and in the continuous employ of the company for not less than 6 months.

The final authority for the management of the company, it is stated, is fixed by the laws of Ohio, in the board of directors. But subject only to the right of the directors to veto and annul, the industrial assembly shall have the power to make changes in factory regulations on the subject of wage adjustments, working conditions and grievances.

Provision is also made to consider such questions by joint conferences where the men meet an equal number of representatives of the management.

Legislative power of the assembly is exercised by the adoption of resolutions and measures which are signed or vetoed by the factory manager. When vetoed by the factory manager the bills may be passed by a two-thirds vote in each house, when they become a part of the factory rules and regulations. It is planned that there shall be no discrimination against any one whether a member in a labor organization or not, or against any member because of any vote he may cast.

WESTERN GOODYEAR PLANT

AKRON, OHIO, June 24—It is said here that the Goodyear Tire & Rubber Co. has secured options on 480 acres of land in Los Angeles, Cal., and will build a branch plant there. A capitalization of $7,500,000 is contemplated and has already been underwritten by a banking syndicate.

F. A. Seiberling, president of the company, stated that an option has been taken on Pacific coast land, but no definite decision has been made on the erection of a plant.

If the move materializes it will be the first expansion of any of the Akron rubber companies outside of this city. Los Angeles is on the route to the Goodyear rubber plantations in the Far East, and not far from the company's cotton plantations in Arizona.

WRIGHT-MARTIN MERGER

NEW YORK, June 26—Stockholders of the Wright-Martin Aircraft Corp. and the International Motor Truck Corp. will vote shortly on the proposed merger of the two companies, for which the following detailed plan has been worked out: Wright-Martin preferred will receive International first preferred, par for par, and accumulative, dividends to date not earlier than Sept. 1, 1919, nor later than date of issuance of new stock; Wright-Martin common stock will receive 2.8 shares of International second preferred and two shares of common of no par value for each 100 shares of Wright-Martin; Wright-Martin common will be reduced so that for each 100 shares now outstanding 25 shares will remain in hands of holders in addition to International stock received in exchange.

WADSWORTH PRODUCING AGAIN

DETROIT, June 24—The Wadsworth Mfg. Co., whose production has been greatly curtailed by a strike for several weeks, had practically a full force of new workers on the job. This fact so aroused the strikers that nearly 1000 stormed the plant, smashed 100 windows and badly beat a score of employees. Police reserves scattered the mob and made several arrests. The police have placed heavy guards at the plant and there has been no more rioting. This is the second riot at this plant.

PUBLIC AVIATION FIELD

DETROIT, June 24—Morrow Aviation Field, which cost the government $500,000, was opened to the public Saturday. This field was turned over by the War Department to the Universal Aviation Co., of which Henry M. Leland of the Lincoln Motor Co. is president. During the day several flights were made. The aviation company has four planes on the field. Six more are expected soon. The field's nine hangars will hold about 60 airplanes.

Regular passenger service between Detroit and Cleveland will start at once. Private owners of airplanes are making arrangements to keep their machines in Morrow field hangars. The field will be a landing and general service station for all visiting aviators.

Willys-Overland in Full Production

Normal Output Expected in 30 Days—Operating on 48-Hour Week

DETROIT, June 24—The Toledo, Elmira and Elyria plants of the Willys-Overland Co. are in full operation. Protected by the United States Government, the company believes that the crisis in their 2 months' labor difficulty has been passed. Approximately 5000 men are back in the Toledo plant, and fully 75 per cent of employees have returned in Elmira and Elyria. All departments are now in operation and production is being gradually increased.

Monday saw the first completed cars leave the Toledo plant's assembly line since the calling of the strike. While production is small at present, it will be back to normal within 30 days if present conditions continue. The company has invited all old employees to return with the exception of the radical leaders. The plants are operating on an 8-hr. 36-min.-a-day basis, and one half day Saturday, making a labor period of 48 hr. per week. The day the strike was called there were 13,000 men in the Toledo plant.

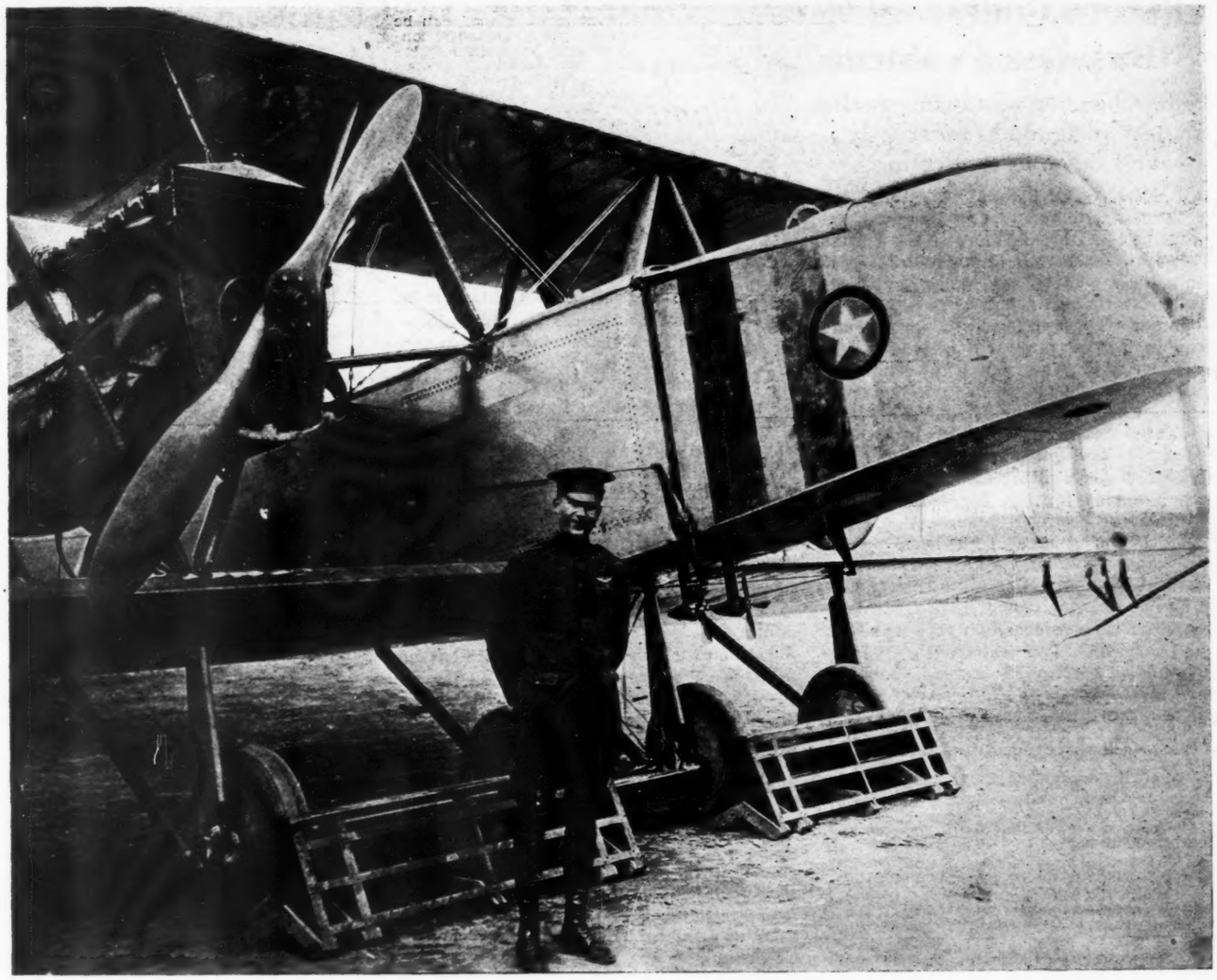
The injunction issued by Judge John M. Killets of the United States District Court, which ordered the Willys-Overland Co. to resume operations at once and continue the plant in operation for a period of 10 days, has been made permanent. This injunction also limits picketing and provides the deputizing of a large number of United States marshals to enforce the order. The action was brought in the United States Court by the Dail-Overland Co., distributer in a Southern state. This company named the Willys-Overland Co., the Toledo Lodge 105 International Association of Machinists, Automobile District Council, and 50 labor leaders as defendants in the action. This injunction will be lifted at the discretion of the court.

For 2 or 3 days following the enforcement of the first temporary injunction there was more or less trouble with strikers, but nothing serious. Several arrests were made.

S. F. BOWSER CO., LTD.

TORONTO, ONT., June 23—S. F. Bowser Co., Ltd., manufacturer, has been organized in Canada as a separate concern under the United States company. It has for a number of years been manufacturing and selling Bowser gasoline and oil pumps, tanks and storage systems under the control of the parent company at Fort Wayne, Ind.

H. C. Christie, who has been for a number of years connected with the Canadian factory of the Bowser company, recently as sales manager, has been elected manager, and R. E. Cummings, factory manager. Other officers are: President, S. F. Bowser; vice-president, S. B. Bechtel, secretary, H. J. Grosvenor; treasurer, W. G. Zahrt.



Capt. Roy N. Francis and the Martin Bomber in which he expects to make a one-stop flight from the Mineola field to San Francisco under the direction of the War Department. The plane carries U. S. Martin twin motors

Labor Approves of Scientific Research

Federation of Federal Employees Passes Resolution to Aid and Support Federal Research

ATLANTIC CITY, June 25—The newest section of the American Federation of Labor, the Federation of Federal Employees, has made its presence felt in the larger body by bringing about the adoption of the following resolution in the convention here:

"Whereas, scientific research and the technical application of results of research form a fundamental basis upon which the development of our industries, manufacturing, agriculture, mining, and others must rest; and

"Whereas, the productivity of industry is greatly increased by the technical application of the results of scientific research in physics, chemistry, biology and geology, in engineering and agriculture, and in the related sciences; and the health and well-being not only of the workers but of the whole population as well, are dependent upon advances in medicine and sanitation; so that the value of scientific advancement to the welfare of the nation is many times greater than the cost of the necessary research; and

"Whereas, the increased productivity of industry resulting from scientific research is a most potent factor in the ever-increasing struggle of the workers to raise their standards of living, and the importance of this factor must steadily increase, since there is a limit beyond which the average standard of living of the whole population cannot progress by the usual methods of readjustment, which limit can only be raised by research and the utilization of the results of research in industry; and

"Whereas, there are numerous important and pressing problems of administration and regulation now faced by federal, state, and local governments, the wise solution of which depends upon scientific and technical research; and

"Whereas, the war has brought home to all the nations engaged in it the overwhelming importance of science and technology to national welfare, whether in war or in peace, and not only is private initiative attempting to organize far-reaching research in these fields on a national scale, but in several countries governmental participation and support of such undertakings are already active; therefore be it

"Resolved, by the American Federation of Labor in convention assembled, that a broad program of scientific and technical research is of major importance to the national welfare and should be fostered in every way by the Federal Government, and that the activities of the Government itself in such research should be adequately and generously supported in order that the work may be greatly strengthened and extended; and the Secretary of the Federation is instructed to transmit copies of this resolution to the President of the United States, to the President pro tempore of the Senate, and to the Speaker of the House of Representatives."

This resolution is of peculiar interest to manufacturers whose business is confronted with the needs of research and who have been, during recent months, depending largely upon government bureaus to aid with this work. The Federation of Federal Employees includes in its membership many scientists and others who have been considered far separated from the average members of the Federation of Labor. But these men believe that their work is common with those who would improve labor conditions and they have enlisted. In the passage of their resolution, they were assisted by the teachers' organization.

P. G. Agnew of the Federal Federation, who was one of those who appeared before the resolutions committee, says that the sponsors of the resolution were closely questioned by the practical workers on that committee and that the practical miners, metal workers and other skilled trades questioned them sharply as to the nature of the work done by the bureaus.

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WELLS ADDS TO MACHINE SHOPS

KENOSHA, WIS., June 20—The Frank L. Wells Co. is adding to its plant at a cost of about $50,000 fully equipped.

Allies to Confer on Business Problems

U. S. Chamber of Commerce Invites England, France, Italy and Belgium to Meeting

WASHINGTON, June 21—Invitations have been sent by the Chamber of Commerce of the United States to the United Kingdom, France, Belgium and Italy to send joint commercial missions to the United States in the fall as guests of the Chamber. The missions will arrive some time in October and will include representatives of the four governments. Full details are yet to be received from representatives of the Chamber abroad, who are arranging for the trip. The Executive Committee of the Chamber appointed a committee to-day to arrange entertainment for the missions and for conferences between members of the missions and American business men.

A canvass to-day by the Executive Committee of the Chamber shows that 12 of the 13 principles of industrial relations, sent to a referendum vote April 16, was carried. The thirteenth, recommending a system of national employment offices, received a majority vote, but not the two-thirds necessary to carry.

The principles submitted to vote are as follows:

1. Industrial enterprise, as a source of livelihood for both employer and employee, should be so conducted that due consideration is given to the situation of all persons dependent upon it.

2. The public interest requires adjustment of industrial relations by peaceful methods.

3. Regularity and continuity of employment should be sought to the fullest extent and constitute a responsibility resting alike upon employers, wage earners and the public.

4. The right of workers to organize is as clearly recognized as that of any other element or part of the community.

5. Industrial harmony and prosperity will be most effectually promoted by adequate representation of the parties in interest. Existing forms of representation should be carefully studied and availed of in so far as they may be found to have merit and are adaptable to the peculiar conditions in the various industries.

6. Whenever agreements are made with respect to industrial relations they should be faithfully observed.

7. Such agreement should contain provision for prompt and final interpretation in the event of controversy regarding meaning or application.

8. Wages should be adjusted with due regard to the purchasing power of the wage and to the right of every man to an opportunity to earn a living at fair wages, to reasonable hours of work and working conditions, to a decent home, and to the enjoyment of proper social conditions.

9. Fixing of a basic day as a device for increasing compensation is a subterfuge that should be condemned.

10. Efficient production in conjunction with adequate wages is essential to successful industry. Arbitrary restriction on output below reasonable standards is harmful to the interests of wage earners, employers and the public and should not be permitted. Industry, efficiency and initiative, wherever found, should be encouraged and adequately rewarded, while indolence and indifference should be condemned.

11. Consideration of reduction in wages should not be reached until possibility of reduction of costs in all other directions has been exhausted.

12. Administration of employment and management of labor should be recognized as a distinct and important function of management and accorded its proper responsibility in administrative organization.

13. A system of national employment offices, with due provision for co-operation with existing state and municipal systems, can be made, under efficient management and if conducted with due regard to the equal interests of employers and employees in its proper administration, a most helpful agency, but only if all appointments are made strictly subject to the Civil Service law and rules. Policies governing the conduct of a national system of employment offices should be determined in conjunction with advisory boards—national, state and local—equally representative of employers and employees.

Reorganization of the Chamber into departments to conform with the industrial, economic and social divisions of its membership is proceeding and will be completed this year. The best men obtainable for the places will be secured as heads of the departments.

The Chamber's board of directors will hold its meeting in Seattle in July. Members of the board living in the East will travel to Seattle together from Chicago, stopping at Denver, Salt Lake City and California cities for conferences with business interests. The return trip will be made by way of Minneapolis.

INDUSTRIAL CONFERENCE

WASHINGTON, June 20—A national conference for the consideration of industrial problems and the adjustment of differences between capital and labor is proposed in a joint resolution offered in the House by Representative Kelly of Pennsylvania.

It provides that the President be authorized to call a national conference to be composed of the following persons representing both employers and employees: E. H. Gary, William H. Johnston, Frank P. Walsh, Charles E. Hughes, A. B. Garretson, William K. Vanderbilt, Franklin K. Lane, William B. Wilson, John D. Rockefeller, Samuel Gompers. Daniel Guggenheim, Charles H. Moyer, J. P. Morgan, Andrew Furuseth, F. S. Peabody, Frank J. Hayes, J. Ogden Armour, J. Fitzpatrick, E. L Stotesbury, W. D. Mahon and such other persons as the President may name, equally divided among leading representatives of labor and capital.

It shall be the duty of the conference to consider, with a view of the permanent solution of the same, such problems as may be presented to it relating to permanent relations of capital, labor, industrial management, adjustment of wages, settlement of industrial disputes, promoting improved conditions and greater industrial efficiency as a nation.

AMERICAN STEEL UNRESTRICTED

LONDON, June 10—Though American steel is selling in Great Britain at approximately $22 a ton less than the British product, the government is not prepared to restrict importations, Sir Auckland Geddes, president of the Board of Trade, stated in response to a question in the House of Commons.

The American Chamber of Commerce here reports that Sir Auckland declared an adequate supply of iron and steel was essential to the manufacture of articles for the British export trade, even if it had to come from the United States.

U.S.War Vehicles for Disposal by France

American Equipment Comprises 100,000 Vehicles—Manufacturers Will Maintain Stocks

PARIS, May 24—All automotive material held by the American army in France will be disposed of by the French Government. This material comprises 100,000 vehicles, of which 65,000 are trucks and touring cars, and about 35,000 motorcycles with or without side cars. Although it was decided that the American army should sell nothing direct, the French do not state when they will put this American material on the market.

It is understood that the intention of the French Government is to dispose of the whole of its own automotive material before allowing any American machines to be sold. Until now not a single American automobile has been sold in France, although a certain number have been disposed of for shipment to other European countries.

Telegrams have been received by the Motor Transport Corps in France from practically all American manufacturers who supplied cars or trucks to the army stating that they are prepared to maintain stocks and spare parts in France for the benefit of purchasers of their vehicles.

The first sales of American vehicles having any connection with the Motor Transport Corps took place at Verneuil this week. These vehicles comprise 68,000 rolling kitchens, water wagons, and other horse-drawn vehicles or trailers belonging to the Quartermaster Corps.

This is not Motor Transport Corps material and its presence at the Motor Transport Corps reconstruction park is explained by the fact that Verneuil undertook to repair not only motor vehicles, but also most of the Quartermaster Corps' rolling stock.

EXPORTS DECREASE IN MAY

WASHINGTON, June 20—Exports for May totaled $606,000,000, a falling off of $108,000,000 from the record set in April, but an increase of $55,000,000 over May, 1918, according to a statement issued by the Bureau of Foreign and Domestic Commerce, Department of Commerce. For the 11 months ended May, the export trade amounted to $6,308,000,000, an increase of $872,000,000 over the corresponding period of the previous year.

May imports were the largest in the history of that country's foreign trade—$329,000,000, a gain of $56,000,000 over April, and of $6,000,000 over May, 1918, which was the previous high mark. Imports for the 11 months ended May were valued at $2,803,000,000, an increase of $118,000,000 over a similar period in 1918.

The excess of exports over imports during the 11 months was $3,505,000,000, as compared with $2,751,000,000 for the corresponding period in 1918, and $3,364,000,000 in 1917, the previous record.

Tractors in 6 Classes for English Trials

Royal Agricultural Society Makes Public Comprehensive Regulations for 1920 Events

LONDON, June 10—The Royal Agricultural Society has made public the regulations drawn by that body for the Agricultural Tractor and Plow Trials to be held under its auspices in the autumn of 1920.

These regulations are especially interesting when compared with the regulations announced to govern the tractor trials to be held at Lincoln, England, in September of this year. These regulations, which were printed in the June 5 issue of AUTOMOTIVE INDUSTRIES, on page 1243, were drawn by the Society of Motor Manufacturers' and Traders', Ltd., which is the great national automotive organization of Great Britain.

The Royal Society regulations are more comprehensive in several particulars. They require demonstrations of hauling and of driving barn machinery. The price of the machine is also to be made a consideration in the awards. The exhibitor must set out very clearly the amount of fuel, the number of assistants and any other equipment he will require.

There are six classes with prizes of $100 and of $50 in each. The classes are as follows:

Class 1—Internal combustion direct tractor engine not exceeding 30 B.hp., suitable for plowing 2 or 3 furrows, 10 in. by 6 in. deep.

Class 2—Internal combustion direct traction engine over 30 B.hp., suitable for plowing 4 furrows, 10 in. wide by 8 in. deep.

Class 3—Direct traction steam engine plant, suitable for plowing 4 furrows, 10 in. wide by 8 in. deep. Engines to comply with the requirements of the Light Road Locomotive Acts.

Class 4—Internal combustion double engine set, with wire rope haulage, for plowing 3 or 4 furrows, 10 in. wide by 8 in. deep. Engines to comply with the requirements of the Light Road Locomotive Acts.

Class 5—Double steam engine set, with wire rope, haulage, for plowing 3 or 4 furrows, 10 in. wide by 8 in. deep. Engines to comply with the requirements of the Light Road Locomotive Acts.

Class 6—Self-propelled plow for plowing not more than 4 furrows, and not more than 16 in. wide by not more than 8 in. deep.

CLASSES I–V

1. For the purpose of these trials, an "agricultural tractor" shall be capable of:
   (a) Hauling direct in work or on the road, a plough, cultivator, harvester, or other agricultural implement.
   (b) Driving barn machinery.

2. The machines shall be tested for efficiency in carrying out the various classes of work.

3. Competitors will have to plow a given area of land with their own tractor and plow, commencing with the size of furrows specified for each class, during which the fuel and water consumption will be recorded, and subsequently varying the depth and width at the discretion of the judges.

4. Further trials on various classes of land with multiple plows and with other cultivating implements to be provided by the competitors, or which the society may have at its disposal and with which they may wish their tractors to be tried, may be made at the discretion of the judges.

5. Special attention will be paid, in the plowing and cultivating trials, to the compression of the land by the machine, the space and time occupied in turning, the uniformity of the furrow ends and evenness of the furrow.

6. The engines in classes 2, 3, 4 and 5 shall be capable of road haulage and will be tested in that respect over courses which will be set out over the roads and land selected by the society, and each competitor shall declare before starting what weight he is prepared to haul over such course; the fuel, water and other supplies consumed will be noted on the road trial. With selected motors hill-climbing trials may be made. Motors fitted with winding gear may have the opportunity of demonstrating its advantages. Motors must conform to the requirements of Acts of Parliament.

7. Each motor will be tested driving on to a pulley on a countershaft fitted with a brake. The diameter of the pulley, speed of countershaft, and load on brake assimilating to those of a threshing machine.

8. The time taken and attendance given will be noted in all trials.

9. Implements, except plows, unless otherwise stated, will be provided by the society.

10. The fuel, whether solid or liquid, will be provided by the society. The coal will be Welsh steam coal of uniform quality, and the petroleum or other liquid of one of the recognized brands.

11. Each competitor to state how many men will be required to attend to the machine.

12. The following are some of the points to which special attention will be directed:
   (a) Weight of machine.
   (b) Weight per inch width of wheel and diameter of wheel.
   (c) Mechanical design and construction.
   (d) Adaptability to various kinds of work, such as harvesting and the like.
   (e) Time taken to prepare for work.
   (f) Ease and safety of handling.
   (g) Ease of turning and space required for same.
   (h) Efficiency of winding gear.
   (i) Facility of attachment.
   (j) Wheel devices.
   (k) Attendance necessary.
   (l) Consumption of fuel, water and other supplies per unit of work done.
   (m) Price.

SELF-PROPELLED PLOWS—CLASS VI

The trials of these will be on the same lines as the plowing trials in Classes I and II.

13. The judges' decision, when duly recorded, will in all cases be final.

14. The society's Implement Regulations will apply to these trials generally.

FIELD FOR TRACTOR DITCHERS

LONDON, June 10—Demonstrations near Glasgow of a Buckeye tractor ditcher have revealed the comparative absence of plants of this sort in Great Britain. This affords an opportunity for American enterprise to benefit by an apparent need of machinery for ditch clearing and field drainage.

The new appliance, brought out with funds of the Board of Agriculture for Scotland, is the first of its kind in the British Isles and is intended to overcome the prohibitive cost of drainage by manual labor and the impossibility of obtaining enough labor.

The demonstration, arranged by the Highland and Agricultural Society, covered a period of ten days. The ditcher consists of a revolving wheel suspended to the rear of the tractor. On this wheel are the cutters or buckets, after the style of a dredger, and with the revolution of the wheel the earth is carried to the surface, where it is deposited on an endless canvas which takes it from the machine and places it about 2 ft. from the edge of the drain. One man and a helper operate the machine. On the first day of the demonstration it cut a field drain 200 yd. long, by 2 ft. deep and 12 in. wide, in 35 minutes. The ditcher can cut varying depths and widths. The consumption of gasoline works out as something like 0.9 gal. per hp. for a working day of ten hours.

British Tractor Scheme Expensive

Heavy Loss Sustained by Food Bureau in Ploughing Farmers' Lands

LONDON, June 3—Net losses of $4,199,850 were sustained by the Food Production Department in connection with its motor tractor ploughing scheme in 1917-18. It was expected when the project was organized that the entire cost would be recovered from the farmers.

Working expenses, depreciation of machinery, administration and other charges amounted to $5,812,210, while the total recovered or due for service performed was only $1,662,360.

The department obtained 6000 motor tractors through the Ministry of Munitions at $750 each, in addition to the cost of freight from America and assembling in this country. There was delay in delivery, and 2500 machines were re-sold to the contractors at $1000 each, and were subsequently re-sold by them to farmers at $1250 each.

In reply to the Auditor General's request for information as to why it was decided to re-sell to the contractors instead of direct to the farmers, it was stated that the department had no organization for obtaining orders from farmers, whereas the contractors already possessed such an organization.

As the bulk of the tractors were Fordsons, it is obvious that the Ford interests were indicated, and it is a fact that the bulk of the organization of the national tillage scheme was in the hands of Ford agents, a preference which was resented by the implement dealers at large.

It was in connection with this scheme that the organizing services of Sir Percival Perry were used.

The Fordson tractor is now listed at $1400. Reports of the machine is on the whole favorable.

In connection with its general work the Food Production Department placed 6000 tractors at the disposal of the farmers, trained drivers and plowmen and cultivated private land at less than cost.

TRACTOR ON PIKE'S PEAK

DENVER, COL., June 21—A tractor has scaled Pike's Peak. Following the demonstration here a Holt 5-ton caterpillar tractor, such as was used by the A. E. F., was sent to Colorado Springs and from there ascended Pike's Peak. In the last two miles 15-ft. snow drifts were overcome. Col. M. A. Champlin, recently of the A. E. F., was in charge of the tractor.

CHAMPION PLUG IN CANADA

DETROIT, June 23—The Champion Spark Plug Co., Toledo, has started work on its $225,000 Canadian branch in Windsor, Ont.

Automotive Steel Purchases Heavy

Change in Price Not Likely—Contracts on Sliding Scale Basis

DETROIT, June 19—More and larger orders for steel have been placed during the last 2 weeks than for any like period since the signing of the armistice.

The General Motors Corp. has just contracted for 200,000 tons. The Ford interests, including the Ford Motor Co., Henry Ford & Son, and the Ford Shipbuilding Co., have bought and most of the big automotive concerns in the Detroit district are protecting their source of supply by contract. The industry is apparently convinced that the price of steel is about stationary.

Few of the companies are binding themselves with "iron-clad" contracts. They are contracting to use a specified amount of steel during a period varying from 1 to 1½ years. All contracts are of the sliding-scale variety, based upon the market price of steel at the time of delivery.

None of the companies are agreeing to use a certain amount of steel each month. although some are furnishing estimates as to their approximate monthly consumption. They will not commit themselves to any agreement, however, which might force them to accept a fixed amount of steel each month.

While the big concerns are buying by contract the smaller companies continue to buy as they need material. This hand-to-mouth policy has been followed in a majority of cases ever since the signing of the armistice.

Not Waiting for Price Reductions

Automobile companies are buying heavily. The truck industry is beginning to place larger steel orders. The same also applies to the machinery men and parts makers.

Placing of steel orders by the railroad administration under protest is the big factor in steadying the steel market. While the administration was holding out for a lower price, the industry awaited expectantly and was prepared to take advantage of any price reduction. The purchasing agents were farily confident that the railroad administration would succeed in bringing prevailing prices down several points and no large orders were placed. It appears that the railroad administration has given up the fight and is preparing to buy at present prices. This action caused the industry to discard its watchful-waiting tactics.

As compared with 1914 prices, the cost of steel to-day is high, although 40 per cent less than it was 7 months ago. Blue annealed steel is priced at $3.55 per 100 lb. Plate steel at $2.65, and hot rolled steel, $3.05. The price on Nov. 19, 1918, for blue annealed steel was $4.25, which is 70 cents higher than the price now paid for the same material. In 1914, however, this same grade of steel was selling at $1.40 per 100 lb., the price increase in 5 yr., based on the above figures, being more than 200 per cent.

Indications do not point to further steel price decreases, the biggest factor preventing price reduction being the labor situation, both in the mining and rolling mill districts.

PAIGE BUILDING IMPROVEMENTS

DETROIT, June 21—The Paige-Detroit Motor Car Co. is spending $400,000 in plant equipment and other improvements which will permit an increase in production facilities of approximately 25 per cent. It applies to both the passenger car and truck divisions of the plant.

No new buildings are being built, but the new units completed for war work and containing approximately 66,000 sq. ft., are being utilized. The company expects to have the improvements completed and to be operating on an increased production schedule within 60 days.

The present capacity of the automobile department is 125 cars daily, while the truck department has facilities for 50 a day. The new arrangement will permit the manufacture of 175 passenger cars and 75 trucks daily.

The Paige company has been hard hit by a shortage of materials. During the month of May, 1500 passenger cars were produced, the daily production being approximately 55. From 3 to 10 trucks are turned out daily.

KELLY-SPRINGFIELD BUILDS

NEW YORK, June 24—To finance erection of a new plant at Cumberland, Md., the Kelly-Springfield Tire Co. is issuing $5,800,000 of 8 per cent preferred cumulative stock. The issue will be offered to both common and preferred shareholders at par ($100) and will be underwritten by a syndicate.

With completion of the first unit of the Cumberland plant, according to A. L. Scheuer, chairman of the board, the company's production will be materially increased over the combined output of the Akron and Wooster, Ohio, and Buffalo, N. Y., factories.

BOHNET READY FOR PRODUCTION

LANSING, MICH., June 18—The John Bohnet Co., which recently entered the truck body business, has completed alterations necessary for body production. The company, which utilized a part of the old Clark shops for its painting and all-season top departments, has leased the entire property and will occupy all floors of the old plant. By July 1 body production will begin.

This fall the company plans to erect a new plant on land on which it has options in another part of the city. While the company will move its body building activities to the proposed new factory building, the entire Clark property will be retained for the repainting department.

Stutz Pioneer Quits Office

Harry Stutz Retires as Active Head of Parent Company

NEW YORK, June 24—Harry C. Stutz, pioneer in the manufacture of the car which bears his name, will retire July 1 as active head of the Stutz Motor Car Co. of America. He will give up both the presidency and general managership, remaining in the organization merely as a member of the board of directors.

In the presidency Mr. Stutz will be succeeded by Allen A. Ryan, head of Ryan & Co., bankers, and vice-president of the Stutz concern during the past year. His successor as general manager has not yet been selected.

The reorganization, effected at the recent annual meeting, included the election of Frederick E. Gunnison of the directorate to the vice-presidency and the naming of George F. Lewis as secretary to succeed Kenneth R. Howard. William N. Thompson was re-elected treasurer.

Directors chosen, in addition to Messrs. Ryan, Stutz, Gunnison and Thompson, were: George H. Saylor, John J. Watson, Jr., and Hicks A. Weatherbee. The last named, the only new member of the board, succeeded Mr. Howard, who is connected with the Ryan banking firm.

Mr. Stutz, who organized the original Stutz company in Indiana, became head of the Stutz Motor Car Co. of America upon its incorporation in 1916.

Mr. Ryan said there would be no change in the manufacturing or sales policies of the Stutz concern as a result of the reorganization. Neither he nor his associates were aware of the future plans of Mr. Stutz.

INDIANA S. A. E. MEETS

INDIANAPOLIS, June 23.—The Indiana Section of the Society of Automotive Engineers held one of its summer meetings last week. It was attended by 91 members and guests. L. H. Pomeroy, formerly chief engineer of the Vauxhall Co., England, spoke on the difference between English and American manufacturing, and the engine of the future.

PACKARD INCREASES CAPITAL

DETROIT, June 26—Stockholders of Packard Motor Car Co. met to-day to vote on a plan authorizing an increase in the company's capital stock from $21,000,000 to $50,000,000.

Only $7,000,000 of 7 per cent preferred stock will be sold at this time. This will be underwritten by a New York syndicate. The $7,000,000 issue anticipates the retirement of $5,000,000 in gold notes due in October, and provides $2,000,000 working capital.

Under the new capitalization $30,000,000 will be common stock and $20,000,000 preferred stock. In 1915 sales totaled $15,000,000 and in 1919, $64,000,000.

26 Flying Fields Retained by U. S.

14 to Be Used for Storage—Present Proposed Disposition of Fields Shown

WASHINGTON, June 20—Twenty-six flying fields will be retained permanently by the Air Service of the United States War Department, and 14 will be retained temporarily for storage and other purposes. No fields are being abandoned or sold at present. Following is a table showing the present proposed disposition of the fields:

1. Owned by U. S.
2. Being purchased.
3. Retained under lease.
4. Retained temporarily for storage.
5. Retained temporarily.
6. To be abandoned.
7. Being sold.

AVIATION FIELDS, ETC.

Wilbur Wright Field, Ohio	4
Barron Field, Texas	4
Bolling Field, D. C	5
Brooks Field, Texas	2
Call Field, Texas	4
Carlstrom Field, Fla	2
Carruthers Field, Texas	4
Chapman Field, Fla	2
Chanute Field, Ill	2
Dorr Field, Fla	2
Eberts Field, Ark	4
Ellington Field, Texas	2
Gerstner Field, La	4
Hazelhurst Field, N. Y	3
Kelly Field, No. 1, Texas	1
Kelly Field, No. 2, Texas	2
Langley Field, Va	1
Love Field, Texas	4
March Field, Cal	2
Mather Field, Cal	2
Mitchell Field, L. I	2
Park Field, Tenn	2
Payne Field, Miss	4
Post Field, Okla	1
Rich Field, Texas	4
Rockwell Field, Cal	1
Scott Field, Ill	2
Selfridge Field, Mich	2
Souther Field, Ga	2
Taylor Field, Ala	4
Taliaferro Field, Texas	4

AVIATION GENERAL SUPPLY DEPARTMENT AND BALLOON SCHOOL.

Middletown, Pa.	2
Richmond, Va.	*1
San Antonio, Texas	1
Dallas, Texas	5
Montgomery, Ala.	2
Fairfield, Ohio	1
Garden City, L. I	5
Arcadia, Cal.	2
Lee Hall, Va	1

*Purchased. Passed into hands of United States about June 15.

Note.—The Aerial Coast Defense Station, New Dorp, Staten Island, N. Y., was omitted from the list. This station is owned by the United States.

AVIATION APPROPRIATION INCREASED

WASHINGTON, June 21—The House Military Affairs Committee has increased the appropriation for the Army Aviation service to $55,500,000. Special provisions in the new Army bill allow $982,000 for the purchase of the Curtiss-Ellwood aviation plant at Buffalo, $3,260,000 for the purchase of the Dayton-Wright airplane plant at Dayton, $3,500,000 for the purchase of the dirigible landing field and hangars in Burlington County, N. J., and $470,000 for Rockwell Field, San Diego, Cal.

$35,000,000 FOR NAVAL AVIATION

WASHINGTON, June 20—The Senate Naval Affairs Committee to-day voted to allow $35,000,000 for naval aviation during the coming year. Secretary of the Navy Daniels yesterday asked for $36,000,000, but said he could get along on $35,000,000.

FRENCH AVIATION LOSSES

PARIS, June 1—From Aug. 4, 1914, to armistice day the losses of the French air service at the front were 1945 pilots and observers killed, 1461 missing and now assumed to be dead, and 2922 wounded. These losses cover the fighting zone only.

In the interior zone, which covers the lines of communication, schools, etc., the losses were 1927 pilots and observers. This gives a total loss for the French air service of 7,757 pilots or observers.

The French flying staff on Dec. 1, 1918, consisted of 12,919 men. The losses therefore represent 61 per cent of the total.

AIRCRAFT FOR EDUCATION

WASHINGTON, June 20—A joint resolution offered to Congress this week authorizes the Secretary of War to loan airplane engines, airplanes, aeronautic equipment and parts to educational institutions which maintain scientific departments. This equipment is to be loaned for educational purposes only under such regulations as may be prescribed by the Secretary of War. The resolution was referred to the Committee on Education and Labor.

Training Planes and Engines Sold

WASHINGTON, June 23—Eleven hundred Standard J-1 planes, 4608 Curtiss OX-5 engines and 1616 Curtiss JN-4 planes without engines have been sold by the War Department to the Curtiss Aeroplane & Motor Corp. for approximately 12 per cent of the original cost. The following table shows the types sold, with the approximate cost and selling price:

Type	No. sold	Approx. unit cost price	Unit sale price	Sale price in per cent of cost
SJ-1 plane	1,100	$4,750	$200	4
JN-4 plane	1,616	4,750	400	8
OX-5 motor	4,608	2,100	400	19

ONE ENGINE ON ORDER

WASHINGTON, June 20—All outside orders for airplane service engines have been completed, according to the War Department, except one order for a Hispano-Suiza 300-hp. engine. This original order was for 10,000, but 9500 have been cancelled, leaving 500 on order. Of these, 499 have been completed, leaving but one engine still on order, which is expected to be delivered this week.

Air Regulations for Flight and Passengers

Provisions for Number of Passengers, Landing and Starting, Sale of Gasoline and Oil

WASHINGTON, June 20—The Director of Air Service has issued regulations for flights in aircraft under the control of the Air Service and for carrying passengers, landing and taking-off from flying fields, and for the sale of gasoline and oil to pilots not in military service. Flights can be made:

(a) For the proper execution of any approved project of the Air Service, or of the Air Service in co-operation with any other branch of service or department of the government—special approval of this office to be secured in each case.

(b) For the demonstration of aircraft, and aircraft development to officers of the executive, legislative and judicial branches of the government.

(c) For the rapid transportation of military or civilian officials of the government, of messages or parcels in cases of urgent necessity and for the convenience of the government.

(d) For the assistance of stranded civilian aviators or where it is necessary for the saving of human life.

The following may be carried as passengers in aircraft under the control of the Air Service:

(a) Any person necessary to be carried as a passenger to accomplish the purpose of any of the flights authorized in Paragraph No. 1 above.

(b) Officers and enlisted men of the army, navy and marine corps, both active and reserve.

(c) Officers and enlisted men of foreign armies, as a courtesy when they are visiting the United States.

Aircraft Pilots

No person will be permitted to pilot aircraft under the control of the Air Service except regularly authorized Air Service pilots or bona fide student-pilots of the Air Service.

Persons operating aircraft who are not in the military service or who are not under the jurisdiction of the Air Service, will be permitted to use Government facilities at Air Service stations contingent upon their proper observation of the air and ground rules in force at the particular station in question, and subject to the discretion of the commanding officer thereof, as not interfering with the proper conduct of official business of his station, as follows:

(a) They may be permitted to land and take-off from flying fields.

(b) They may be permitted to place airplanes in government hangars over night or for a short time pending repairs.

The sale of gasoline, oil, spare parts, etc., or the furnishing of the labor of Air Service mechanics in any form to pilots not in military service is forbidden.

16,000 More Surplus Vehicles Possible

Likely to Be Turned Over to Various Government Departments

WASHINGTON, June 24—That there may be 16,000 more vehicles surplus above the 39,000 already so classified and distributed to Government Bureaus was indicated by testimony before the Senate Military Affairs Committee when C. W. Hare, Director of Sales, Colonel Fred Glover and others testified with regard to the disposition of surplus munitions.

Testimony showed that there were 64,334 trucks and 11,179 passenger cars in the Army, a total of 75,513. Of this number, 5676 cars and 33,485 truck, a total of 39,161, are held, and 5503 cars and 30,849 trucks, a total of 36,352, have been declared surplus and are being transferred to other Government Bureaus.

Colonel Glover stated that the temporary reserve of 16,000 additional vehicles is included in the 39,161 which are still held by the Army, and these may be turned over later as surplus, so that the army will retain from 18,000 to 22,000 vehicles. There are also 23,543 trailers which are to be divided into permanent and surplus quantities and disposed of.

The testimony also developed the sales of tanks, tractors and airplanes. Mr. Hare showed that through the Department of Sales considerably higher prices were being secured, and cited two 6-ton tanks which the Ordnance Department had expected to sell for scrap at $1,000. These tanks were sold for $3,000 each by the Director of Sales. Likewise, thirty 45 hp. Holt tractors, costing the Government $5,800 each, were to be distributed for less than $1,000 each by one of the army camps.

Clevelands Go to Agriculture Department

The Department of Sales took over the tractors and distributed them to other divisions of the War Department. Forty-eight Gray wide drive drum tractors, reported surplus by the Ordnance Department, costing the Government $105,000, were to be sold back to the Gray Tractor Company at $50,000. Negotiations by the Department of Sales increased the offer to $65,000. This offer was not accepted and the tractors were sold in part to the Department of Commerce and Bureau of Fisheries for use in the Arctics, and the remainder have been transferred to the Bureau of Public Roads. Twenty-eight Cleveland tractors, appraised by the Ordnance Department at $400 each, were offered for sale, and the sale was stopped by the Department of Sales, and all but two of these tractors turned over to the Department of Agriculture. The remaining two were sold for $600 each.

Letters introduced, combined with discussions, show that the War Department, which recently sold 4608 Curtiss OX-5 engines, 1616 JN-4 airplanes without engines and 1100 Standard J1 airplanes without engines, valued at $20,000,000, to the Curtiss Aeroplane & Motor Corp., Buffalo, for $2,720,000, had offered these to the entire aeronautical industry and was unable to secure bids from others than the Curtiss company. It was shown that before the sale was consummated contracts were carefully drawn up, and the approval of Major General C. T. Menoher, Director of Air Service, and Secretary of War Newton D. Baker, was secured.

General Menoher pointed out that there is no general market for airplanes or airplane engines, that the industry is in its infancy, that designs change rapidly and that consequently it was to the general welfare to sell these planes and engines to a reliable manufacturer to be overhauled and sold with his guarantee. The Standard Aeroplane Corp. also made bids on the material but their tentative offer wos not as high as that made by the Curtiss company.

Approximations of the surplus supplies still held by the various Bureaus show the total surplus valued at $62,000,000 held by the Aircraft Production Division of the Air Service, of which practically $60,000,000 worth remains to be sold; $85,000,000 worth held by the Division of Military Aeronautics, Air Service, of which more than $80,000,000 worth remains to be sold.

MACHINERY MANUFACTURERS MEET

NEW YORK, June 20—Time, labor and money saving benefits derived from the use of motor trucks, trailers and kindred equipment in the handling of materials were described by J. M. Van Harlingen, of the Republic Motor Truck Co., in an address before the recent annual meeting of the Material Handling Machinery Manufacturers' Association. He told how the Fiske Rubber Co. had synchronized its factory transportation by using industrial trucks, trailers, elevators, etc., handling all of this under the management of one transportation superintendent, with the result that the first year the direct economies showed an actual saving of over $50,000 in payroll and plant maintenance costs, to say nothing of the great advantages which accrued to the plant through better delivery, and facilitated movement of all raw materials and finished products.

United States Senator Burton of Ohio urged attention of the members to development of transportation and other devices to hasten the loading and unloading of ships. He cited the profit which might be derived through the saving of only one day for every trip of every ship and urged the prompt installation of any modern means which would help speed up the return of ships to home ports, this of itself helping to offset the shortage of world shipping tonnage which has resulted from the activity of the German submarine war program. He termed expansion of port facilities the controlling factor in upbuilding the American merchant marine.

France Encouraging Peace-Time Aviation

American Aviation Mission to Suggest Development in U. S.—To Visit England

PARIS, June 21 (*Special Cable*)—Its work in France practically completed, the American Aviation Mission, headed by Assistant Secretary of War Benedict Crowell, left Paris this week, the main party proceeding to England, while some of the members, with Howard E. Coffin, representing the Council of National Defense, went to Italy.

The commissioners were impressed with the fact that the French government is giving more encouragement to airplane manufacturers to continue in peace-time business than is the case in the United States.

The mission has been in close touch with all the French aircraft producers and with various French government departments, gathering material for a report to be presented to Congress, suggesting means of developing commercial aviation in the United States.

The mission, having gone abroad without the technical advisers, whose proposed trip was cancelled because of lack of American government authorization, has done no work on standardization, though it received from British aviation authorities in France a full report on the standards situation as it exists in France.

Mr. Coffin's section, returning from Italy, will join Assistant Secretary Crowell and his associates in England, the entire party having planned to sail for home in about two weeks.

BUREAU OF MANUFACTURERS

WASHINGTON, June 24—The establishment of a Bureau of Manufacturers in this city by Congress was proposed yesterday by Senator Sheppard. The Bureau, as proposed, is to study manufacture in all forms and distribute information as a result of the investigations.

In proposing the resolution Senator Sheppard declared that Government Departments are devotel to agriculture, commerce and labor but there are no departments established for manufacture. The great quantities of basic raw materials, which are being shipped abroad, should be converted into finished products in this country. This, he said, can only be done by the development of our manufacturing facilities.

ENLARGING MARMON PLANT

NEW YORK, June 26—The Nordyke & Marmon Co., Indianapolis, is negotiating with underwriters to issue at once $2,500,000 bonds to finance construction of additions to its factory, putting the plant on an extensive production basis. It is believed that the bonds will be put out next week.

Standards Formulated for Women in Industry

U. S. Department of Labor Regulates Hours, Wages and Occupations for Women

WASHINGTON, June 23—Standards for the employment of women in industry have been formulated by the United States Department of Labor, regulating the hours of labor to no more than 8 per day, providing for equal wages with men, prohibiting the employment of women in poisonous occupations, prohibiting home work, and providing for representation for women in organization necessary for collective bargaining.

Following are the complete standards recommended:

I. HOURS OF LABOR

1. Daily hours—No woman shall be employed or permitted to work more than eight hours in any one day. The time when the work of women employees shall begin and end and the time allowed for meals shall be posted in a conspicuous place in each workroom, and a record shall be kept of the overtime of each woman worker.

2. Half holiday on Saturday—The half holiday on Saturday should be the custom.

3. One day of rest in seven—Every woman worker shall have one day of rest in every seven days.

4. Time for meals—At least three-quarters of an hour shall be allowed for a meal.

5. Rest periods—A rest period of 10 minutes should be allowed in the middle of each working period without thereby increasing the length of the working day.

6. Night work—No woman shall be employed between the hours of 10 p. m. and 6 a. m.

II. WAGES

1. Equality with men's wages—Women doing the same work as men shall receive the same wages, with such proportionate increases as the men are receiving in the same industry. Slight changes made in the process or in the arrangement of work should not be regarded as justifying a lower wage for a woman than for a man unless statistics of production show that the output for the job in question is less when women are employed than when men are employed. If a difference in output is demonstrated, the difference in the wage rate should be based upon the difference in production for the job as a whole and not determined arbitrarily.

2. The basis of determination of wages—Wages should be established on the basis of occupation and not on the basis of sex. The minimum wage rate should cover the cost of living for dependents and not merely for the individual.

III. WORKING CONDITIONS

1. Comfort and Sanitation—State labor laws and industrial codes should be consulted with reference to provisions for comfort and sanitation. Washing facilities, with hot and cold water, soap, and individual towels, should be provided in sufficient number and in accessible locations to make washing before meals and at the close of the workday convenient.

Toilets should be separate for men and women, clean and accessible. Their numbers should have a standard ratio to the number of workers employed. Workroom floors should be kept clean. Dressing rooms should be provided adjacent to washing facilities, making possible change of clothing outside the workrooms. Rest rooms should be provided. Lighting should be so arranged that direct rays do not shine into the workers' eyes. Ventilation should be adequate and heat sufficient. Drinking water should be cool and accessible, with individual drinking cups or bubble fountain provided. Provision should be made for the workers to secure a hot and nourishing meal, eaten outside the workroom, and if no lunch rooms are accessible near the plant a lunch room should be maintained in the establishment.

2. Posture at work—Continuous standing and continuous sitting are both injurious. A seat should be provided for every woman employed, and its use encouraged. It is possible and desirable to adjust the height of the chairs in relation to the height of machines or work tables, so that the worker may with equal convenience and efficiency stand or sit at her work. The seats should have backs. If the chair is high, a foot rest should be provided.

3. Safety—Risks from machinery, danger from fire, and exposure to dust fumes, or other occupational hazards, should be scrupulously guarded against by observance of standards in State and Federal codes. First-aid equipment should be provided. Fire drills and other forms of education of the workers in the observance of safety regulations should be instituted.

4. Conditions needing correction—Work is more efficiently performed by either men or women if healthful conditions are established. It is usually possible to make changes which will remove such hazards to health as the following:

a. Constant standing or other posture causing physical strain.
b. Repeated lifting of heavy weights, or other abnormally fatiguing motions.
c. Operation of mechanical devices requiring undue strength.
d. Exposure to excessive heat or excessive cold.
e. Exposure to dust, fumes, or other occupational poisons, without adequate safeguards against disease.

5. Prohibited occupations—Women must not be employed in occupations involving the use of poisons which are proved to be more injurious to women than to men, such as certain processes in the lead industries.

6. Work dress—Work dresses with caps and comfortable shoes are desirable for health and safety in occupations for which machines are used or in which the processes are dusty.

IV. HOME WORK

No work shall be given out to be done in rooms used for living or sleeping purposes or in rooms directly connected with living or sleeping rooms in any dwelling or tenement.

V. EMPLOYMENT MANAGEMENT

1. Hiring, separations, and determination of conditions—In establishing satisfactory relations between a company and its employees a personnel department is important, charged with responsibility for selection, assignment, transfer, or withdrawal of workers and the establishment of proper working conditions.

2. Women in supervisory positions—Where women are employed, a competent woman should be appointed as employment executive with responsibility for conditions affecting women. Women should also be appointed in supervisory positions in the departments employing women.

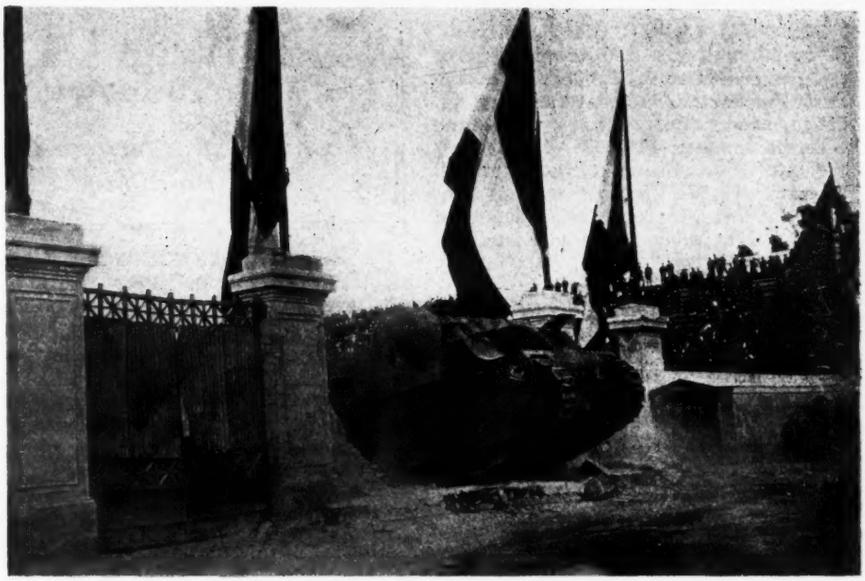
3. Choice of occupation—The opportunity for a worker to choose an occupation for which she is best adapted is important in insuring success in the work to be done.

VI. CO-OPERATION OF WORKERS IN ESTABLISHING STANDARDS

The responsibility should not rest upon the management alone to determine wisely and effectively the conditions which should be established. The genuine co-operation essential to production can be secured only if provision is made for the workers as a group, acting through their chosen representatives, to share in the control of the conditions of their employment. In proportion to their numbers women should have full representation in the organization necessary for collective bargaining.

VII. CO-OPERATION WITH OFFICIAL AGENCIES

The United States Government and State and local communities have established agencies to deal with conditions of labor, including standards of working conditions, wages, hours, employment, and training. These should be called upon for assistance, especially in the difficult problems of adjustment in the period of reconstruction following the war.



A contrast of the old and the new. Recently a war exhibition was arranged for the benefit of the Italian royalty in the Coliseum. There were trenches, huts, wire entanglements and other equipment. Finally came a tank, which destroyed many of these and then turned to leave the grounds, but instead of passing through the gate broke down a part of the wall and went over the ruins

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PROBE WAR DEPARTMENT

WASHINGTON, June 20—The Congressional Committee named by the House of Representatives to investigate the expenditure of $16,000,000,000 has divided itself into five sub-committees to make the inquiry. No date has been fixed for the beginning of investigations.

The special Committee on Aviation comprises Congressman Frear, chairman, and Congressmen Magee and Lea. The Committee on Quartermaster's supplies comprises Congressman Reavis, chairman, and Congressmen MacGregor and Donovan. The Committee on Ordnance includes Congressman Graham, chairman, and Congressmen Jefferis and Garrett. The Committee on Expenditures in Foreign Countries includes Congressman Johnson, chairman, and Congressmen Bland and Flood.

MERWIN HEADS NATIONAL TIRE

EAST PALESTINE, OHIO, June 23—C. L. Merwin was elected president of the National Tire & Rubber Co. at the annual meeting of the board of directors. Other officers are: Vice-president and general manager, S. L. Warner; secretary, C. W. Helman; treasurer, R. B. Taggart. C. E. Miley will become vice-president and general sales manager on July 1. Mr. Miley has been associated with the McGraw Tire & Rubber Co. for the past ten years.

C. E. Albright has been made Pacific Coast field manager of the Acason Motor Truck Co. of Detroit. He will work under Dan Gilkey, Pacific Coast manager.

Carlos Grant, of Concepcion, Chile, has been made resident export manager in charge of export sales in most of the South American countries for the Saxon Motor Car Corp.

A. L. Ditter, former general manager of the Northwest Body Co., Minneapolis, has been appointed sales manager for the Field Manufacturing Co., Owosso, Mich.

C. R. Mabley has been appointed Michigan sales manager for the S. K. F. Industries, Inc. He will open headquarters in Detroit.

C. S. Coler has been appointed manager of the educational department of the Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa., succeeding C. R. Dooley, who resigned.

Hilton W. Sofield has been elected vice-president and general manager of the Commercial Car Unit Co., Philadelphia. He started with the company as service manager in 1917. He has been responsible for the Keystone 2-ton truck added to the company's line of Truxton and Unitrux units.

George S. Shugart has been appointed general sales manager of the United States Tire Co., succeeding J. C. Weston, whose resignation becomes effective July 1. Mr. Shugart, who has been in the U. S. Tire ranks for 23 years, goes to his new office from the sales managership of the New York branch, which he assumed after 12 years of similar work with headquarters in Chicago.

CANADIAN RUBBER ELECTS

MONTREAL, June 20—Sir Charles B. Gordon, K. B. E., and Lieut.-Col. Herbert Molson, M. C., were elected to the board of directors of the Canadian Consolidated Rubber Co., Ltd. The board of directors of the company, besides the newly elected members, includes: Sir Mortimer Davis, E. W. Nesbitt, J. B. Waddell, Victor E. Mitchell, K. C., W. A. Eden, R. E. Jamieson, A. D. Thornton, H. Wellein, Col. Samuel P. Colt, Charles B. Serger, Homer E. Sawyer, J. Newton Gunn and Elisha S. Williams.

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100 FORDSONS A DAY

DETROIT, June 20—The production of Fordson tractors is approximating 100 per day.

Men of the Industry

Changes in Personnel and Position

HANCH TO MANAGE MAXWELL-CHALMERS

DETROIT, June 21—C. C. Hanch, for years treasurer of the Studebaker Corp., has resigned to become general manager of all Maxwell-Chalmers interests. At the outbreak of the war Mr. Hanch was made chief of the automobile products section of the War Industries Board. Since the armistice he has been in Europe investigating export conditions for the National Automobile Chamber of Commerce. Prior to joining the Studebaker Corp. in 1915, he was for 19 years treasurer of the Nordyke-Marmon Co. In recent years he was secretary of the National Chamber of Commerce and is at present a director of that body.

O. E. Szekely, chief engineer and production manager of the tractor department of the Velie Motors Corp., has severed his connection with that company to take over the engineering and production end of the Grid-Iron-Grip Co., Rock Island, Ill., maker of track-laying shoes for tractors and trucks. In addition a general engineering laboratory will be operated as the O. E. Szekely Co. and will furnish drawings and designs in all automotive lines.

F. R. Mead, recently discharged as captain in the Ordnance Department, where he acted as head of the Gage Section Inspection Division, has been appointed Eastern representative of the Wilton Tool & Manufacturing Co., Boston.

George T. Bryant, sales manager of the Hide Leather & Belting Co., Indianapolis, who spent several months in Europe during the first part of the year investigating trade conditions, will leave for a second trip on the Nieuw Amsterdam, sailing from New York on July 2. He will visit France, Switzerland, Belgium, Holland, Denmark, Norway, and Sweden, and plans to return about Nov. 1.

REPRESENTATIVES FOR FOREIGN COUNTRIES

JEANNETTE, PA., June 26—D. D. F. Yard, sales director of the export division of the Pennsylvania Rubber Co., will sail from San Francisco on July 1 for Honolulu, en route to Australia, Straits Settlement, New Zealand, China, Japan, India, and South Africa. R. W. Palm, South American representative, will sail on the same date for Latin America, where the company has agencies. The export office in the Woolworth Building, New York, opened recently, will be in charge of F. B. Beck in the absence of Mr. Yard.

RYAN HEADS STUTZ

NEW YORK, June 23—Allan A. Ryan, head of Ryan & Co., bankers, and formerly vice-president of the Stutz Motor Car Co. of America, was elected president at the annual meeting last week, succeeding Harry C. Stutz.

At the company's offices it was said that Mr. Stutz is still in active charge of the business, but information was unobtainable as to whether he would continue in that capacity.

Other officers elected were: Vice-president, Frederick E. Gunnison; treasurer, William N. Thompson, re-elected; secretary, George F. Lewis, succeeding Kenneth R. Howard.

Directors elected, in addition to officers, were: Harry C. Stutz, George H. Saylor, John J. Watson, Jr., and Hicks A. Weatherbee, succeeding Mr. Howard.

PERRY REMAINS WITH FORD

LONDON, June 10—Sir Percival Perry, who resigned recently as managing director of the Ford interests in Great Britain, will remain with the organization, dividing his time between the London offices and the tractor factory at Cork, it is said in trade circles here.

The factory, delayed in completion by war conditions, is making castings, but no finished products have yet appeared. Work also is under way on the Ford garage at Brook Green, Hammersmith, London, W.

CANADIAN OVERLAND OFFICIAL

TORONTO, ONT., June 20—J. F. Mackay, formerly business manager of the Toronto *Globe* and until lately treasurer of the Russell Motor Car Co., has been appointed secretary-treasurer of Willys-Overland, Ltd., West Toronto.

In his new work Mr. Mackay will be associated with T. A. Russell, president of Willys-Overland, who is also president of the Russell Motor Car Co. Mr. Mackay joined the Russell company last August.

PAIGE APPOINTMENTS

DETROIT, June 23—Frederick L. Jewett has been elected first vice-president of the Paige-Detroit Motor Car Co. Other promotions and appointments were as follows: Vice-president, manufacturing division, W. A. Wheeler; vice-president in charge of passenger car sales, Henry Krohn; vice-president in charge of truck sales, Charles S. Pike; vice-president, purchasing division, Thomas Bradley; vice-president, engineering division, Andrew Bachle; chief engineer, G. C. Mather; production manager, J. V. Quinlan; general superintendent, George Petersen; sales manager of the passenger car division, C. B. Gaunt, and sales manager of the truck division, Frank E. Caulk.

R. Jackson Jones has been appointed district sales supervisor of the Traffic Motor Corp., St. Louis. He returned recently from 15 months' service with the Canadian army in the British West Indies.

Current News of Factories

Notes of New Plants—Old Ones Enlarged

DUESENBERG CARS

ELIZABETH, N. J., June 20—The Duesenberg Motors Corp. is considering entrance on a large scale into the field of passenger car manufacture. Though no decision has been reached, the company still being under government control, E. P. Decker, general manager, stated that a tentative plan was being worked out for the projected expansion. Until a settlement is effected for War Department contracts pending, Mr. Decker said, the project would remain in abeyance.

CANADIAN PLANT FOR STICKNEY

PETERBORO, ONT., June 20—The Stickney Motors, Ltd., St. Paul, Minn., will take over the cordage works recently vacated by the Renfrew Mfg. Co. and manufacture farm tractors, motor trucks and gasoline engines, employing for nine months each year for ten years a minimum of 50 employees.

PERFEX DISCHARGED

RACINE, WIS., June 21—The Perfex Radiator Co. was discharged from bankruptcy by Judge F. A. Geiger of the Federal Court at Milwaukee on June 18, after a hearing on the application of the company in which it developed that arrangements have been effected to pay creditors 100 per cent of claims.

An involuntary petition in bankruptcy was filed against the company March 28, and Julius J. Goetz, Milwaukee, was appointed trustee and later made receiver with authority to continue operations as before. The schedules filed on the petition admitted liabilities of $227,319 and claimed assets of $1,300,000. The discharge from bankruptcy was granted after creditors who filed the involuntary petition indorsed the application and consented to the dismissal of the proceedings.

QUALITY TIRES TAKEN OVER

ELYRIA, OHIO, June 23.—The Long-Wear Rubber Co. has taken over the production and sales of the Quality Tire & Rubber Co., Anderson, Ind. This adds a daily production of 200 casings and 2000 tubes. Both factories will be under the supervision of Frank W. O'Brien, general manager of the company, with headquarters here. Plans for expansion call for the production of 20,000 pneumatic and solid tires daily.

NEW CANADIAN TIRE CONCERN

KITCHENER, ONT., June 23—The Ames-Holden-McCready Co., wholesale shoe manufacturer, has completed arrangements for the formation of a tire manufacturing concern at Kitchener, the new enterprise to be known as the Ames Holden Tire Co., Ltd., and will, it is understood, begin building operations at once.

The new company will have a capitalization of $1,000,000 bonds and $2,000,000 common stock. The board of directors will include T. H. Reider and D. Lorno McGibbon.

MAXWELL-CHALMERS PLANT

NEW YORK, June 23.—The plans for the $10,000,000 plant to be erected for the recently merged Maxwell-Chalmers interests call for 11 manufacturing units and a loading dock. A new office building and power house will also be erected. The machine shop will be the largest. It will be 1-story, 200 by 1,000 ft. The dimensions of the other buildings are as follows: Two storage buildings for assembly parts and finished cars, 4 stories, 100 by 800 ft.; axle plant, 1-story, 150 by 600 ft.; heat treat plant, 1-story, 200 by 300 ft.; engine assembly plant, 1-story, 200 by 300 ft.; pressed steel plant, 1-story, 250 by 600 ft. The loading dock will be 100 by 800 ft.

A body plant will be erected later. Plans for this unit call for a structure 4 stories high, 400 by 600 ft. The two storage buildings will have space for 8,000 unfinished cars and 3,000 finished products. All buildings will be of concrete, brick and steel.

The pressed steel plant, which consists of several 1-story buildings, will gradually be razed, and the buildings of the new plant will take their place.

CONTINENTAL EXPANSION PLANS

DETROIT, June 23.—The Continental Motors Corps. will increase production at both the Detroit and Muskegon plants at once. Every effort will be made to reach capacity production within the next 60 days. The Detroit plant is manufacturing 300 engines daily, and the Muskegon plant 350.

Expansion plans calling for doubling the floor area and increasing production facilities of the Muskegon plant will be put into effect at once. Within the next 2 years the Muskegon plant will be doubled in size. The first units to be built include a power plant, 560 by 180 ft., additions to the engine department, a drop forge plant, and an addition to the screw machine department.

Additional units will be erected on 25 acres of land which the company will reclaim from Lake Michigan. One thousand more men will be employed, and the new plant will have a capacity of approximately 1,000 engines daily.

LION MOTOR PLANT PURCHASED

ADRIAN, MICH., June 21—The old Lion Motor Co.'s site has been purchased by the United Electric Mfg. Co., and an engine plant will be erected soon at a cost of $100,000. The Lion plant has been unoccupied for 7 years. The United Electric Mfg. Co. began operations 3 years ago.

SAVOLD TO OPEN PLANTS

NEW YORK, June 23—The Savold Tire Corp. has completed or has in process incorporation in 21 states. The concern, which has patented processes for rebuilding tires, will operate factories in all the 21 states, it was said at the headquarters here. One of several plants to be opened in New York City will be in operation within a few weeks.

AUTO BODY BUYS ENGINE PLANT

LANSING, June 20—The Auto Body Co. has purchased the plant of the Acme Engine Co. and has obtained a 10-year lease on the land on which the building stands. The Acme Engine Co., reorganized from the Peerless Engine Co., went out of business at the start of the war, most of its machinery being purchased by the Government.

NOVO ENGINE BUILDING

LANSING, June 20—Work has been started on two new buildings for the Novo Engine Co., which are to be ready for occupancy within 40 days.

KALAMAZOO MOTORS ENLARGES

KALAMAZOO, MICH., June 20—The Kalamazoo Motors Corp. has let contracts for the erection of a machine shop having 2,000 sq. ft. of floor space, loading docks and a building for stock purposes. These additions will double the capacity of the plant and permit assembly of from 125 to 150 trucks a month.

REPLACES BURNT BUILDING

DETROIT, June 20.—The Commerce Motor Car Co. had a $100,000 fire Friday, but it is said that production would not be affected in any way. The flames were confined to the paint department. The loss was fully covered by insurance. A new structure to take the place of the destroyed paint shop will be started as soon as the debris is cleared away.

BRISCOE TRIPLES PRODUCTION

JACKSON, MICH., June 20—The Briscoe Motor Corp. will build plant additions which will permit triple production. The present output of 70 cars daily will be increased to 250 cars. The additional units will be ready for production in about 7 months. The company is putting night shifts at work in an effort to increase its output. It has 1300 persons on the pay-roll, 300 of whom are women, and is proposing to go after the truck business, being in production of a 1½ ton truck.

COMPANY NAME CHANGED

ROCKFORD, ILL., June 23—The Bergie National Spark Plug Co. has changed its name to the National Spark Plug Co. to correspond with the name of its product, National spark plugs. There will be no change in the management of the company.

Detroit Needs Men and Houses

Skilled and Common Labor in Demand—Radicals Cause Trouble

DETROIT, June 20—Detroit automotive industries need thousands of workers, but they dare not bring more men to the city because of inadequate housing facilities. Following the signing of the armistice and temporary suspension of manufacturing to permit reconstruction work, a large labor surplus developed. Fifty per cent of all men out of work at that time left Detroit, a fact which aided materially in decreasing the serious surplus.

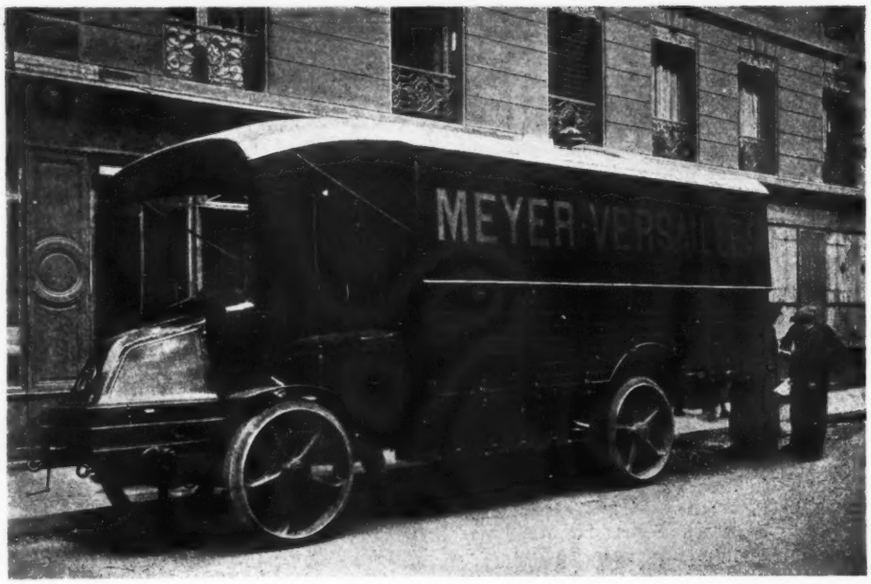
With the resumption of manufacture the surplus that existed here after the exodus of its war workers was quickly assimilated by the industries. As production increased a shortage soon developed, and the Detroit Employers' Association took action to bring more workers into Detroit.

For 3 months this association has brought approximately 2000 men into Detroit every week. Two weeks ago, however, the housing situation became so critical that the importation of workers was brought to a halt. Every available dwelling has been sold or rented, hotels, apartments and rooming houses filled up, and in most cases there is a waiting list.

Hundreds of new homes are being built here, but the number is inadequate. House-building associations have been formed and work on thousands of structures will be started at once, but it will be early winter before the results of this housing campaign bring relief. It is conservatively estimated that the city is short from 30,000 to 50,000 homes.

The housing situation has had a very detrimental effect upon labor conditions. Of the thousands of men brought here within the last 3 months, fully 60 per cent left town within 2 weeks, it is estimated. There has been considerable labor trouble here. A canvass of 115 metal trade industries shows that all have experienced from one to ten strikes during the last 3 months. Most of the trouble was confined to single departments, although in some cases the entire plant was forced to shut down.

The demand for men naturally brought many undesirables. This radical element is responsible for the labor unrest here. A remarkable feature in many strikes recently is the fact that one or two men usually caused the trouble. In the case of the L. A Young Industries, 700 workers walked out as the result of the efforts of one individual. The employees were averaging 75 cents an hour and working an 8-hr. day. The disgruntled worker appealed to the union, cited many alleged grievances and asked that a strike be called. The union investigated and decided against a strike, whereupon the agitator and a handful of fellow radicals called a mass meeting of the employees, and 700 men quit their jobs the next day.



The first motor-driven furniture removal van to go into service in France. The chassis is a Latil 4-wheel drive

While production was badly cut for several days, the company was quick in getting back into operation, and within 2 weeks most of the men had returned to their jobs under old conditions and were apparently satisfied.

At the Studebaker factory 1200 workers at Plant No. 3 were out 10 days, at the end of which time they decided that the issues involved were too trivial to merit a continuance of the strike; so they went back to work. The trouble here was brought about by less than a dozen men.

In the Timken-Detroit Axle case the whole force walked out, and the strike is still in effect. The company is getting back into fair production, hundreds of its men have returned to their jobs, and vacancies are being filled. An unusual feature of this strike lies in the fact that men making as high as $2.35 an hour struck in sympathy and have been idle for 5 weeks.

The Michigan Malleable Iron Works is operating with about one-half its force. The Bowen foundries are not yet back in full production. The situation at both of these plants is rapidly clearing, however. The general foundry strike has fizzled out and all of the gray iron foundries are again at 100 per cent production.

The shortage is of highly skilled and common labor. There is no shortage of semi-skilled labor. In fact, Detroit has always found plenty of semi-skilled men available. The common labor situation is the most critical, and the employers' association is seeking a remedy. It is fighting the immigration bill now before Congress, which, if it passes, will bar immigration into the United States for a period of 4 years. The association holds that it is bad enough to have European countries bar its citizens from entering the United States without the United States throwing up an effective barrier on this side of the ocean. Thousands of foreigners, mostly of the common labor class, are returning to their native lands, and this exodus is already felt here.

Wages in Detroit are higher than ever. Common labor is making from 45 to 55 cents an hour in the shops, and from 60 to 65 cents an hour in the open. Skilled and semi-skilled trades are drawing from 60 to $2.35 an hour, the latter rate being paid to heavy hammer men who work on a piece rate basis.

RICKENBACKER CELEBRATION

LOS ANGELES, June 20—A three-day Rickenbacker celebration will be held here to-morrow, Sunday and Monday, opening on the first day with a large street parade. Sunday, Capt. Rickenbacker will be the guest of honor at an Elks' annual barbecue and will receive a gift from members, and on Monday a reception will be held in his honor in the Shrine Auditorium, when he will be presented with a gift from the people of Southern California.

SHEEPSHEAD PRIZES ANNOUNCED

NEW YORK, June 23—The contest board of the Automobile Association of America announced to-day that the purse for the 100-mile event at Sheepshead Bay July 4 will be $100,000. A $3,000 prize is offered the winner of the special race.

DETROIT SHOW IN MARCH

DETROIT, June 23 — The Detroit Automobile Dealers' Association, at its regular weekly meeting, decided to hold the annual automobile show some time in March.

ESSENKAY ADDITION

CHICAGO, June 23—The Essenkay Products Co has added a 5-story building to its factory.

MOTOR VEHICLES ON ORDER

WASHINGTON, June 24—Motor vehicle orders on May 31, 1919, were $4,077,000 as compared with $416,498,000 on Nov. 11, 1918, showing that about 1 per cent of the orders which were outstanding on the day the armistice was signed, remain for completion. Of the total orders placed, 67 per cent were cancelled and 32 per cent were delivered.

The liquidation of $215,434,000 worth of air service contracts out of a total of $268,400,000 makes a saving of 80 per cent.

PLANES FOR SOUTH AMERICA

NEW YORK, June 23—To develop a South American market for its land and seaplanes, the Curtiss Aeroplane & Motor Corp. will send a mission of aviators and mechanics, together with a number of demonstration machines, to Buenos Aires and Rio de Janeiro on July 1. C. W. Webster, supervisor of sales for South America, will be in charge.

AIRCRAFT LINEN SOLD

NEW YORK, June 23—Cable advices from London announce the sale of the entire linen stock of the Aircraft Equipment Section of the British government, a total amount of 30,000,000 yds., to Leonard J. Martin of the London Mineries. The linen, used in covering airplane wings, represents three-fifths of a year's output of the Belfast looms.

GLOVER TO RESIGN

WASHINGTON, June 24—Colonel Fred J. Glover, who prior to the war was associated with the Emerson-Brantingham Co., and who, during the war, served as Chief of the Motor Vehicle Section, Quartermaster Department, and later as Assistant Director of Sales, will resign on July 1 to enter private business activities, which will be announced later.

STEEL PRODUCTS BUYS PLANT

DETROIT, June 18—The Steel Products Co. of this city and Cleveland has acquired the plant of the Parker Rust Proof Co. of America. The property comprises approximately 4½ acres, on which there is a main building and three other structures, giving a combined floor area of about 65,000 ft. The value of the property is estimated at $250,000.

The purchaser is to take possession as soon as the Parker Rust Proof Co. vacates the premises. The latter is to continue its operations in another plant.

ACME FOREIGN REPRESENTATION

CADILLAC, MICH., June 23—The Acme Motor Truck Co. will be represented in Denmark, Norway, Sweden and Finland by the Aktieselkabet Autocar Co., Copenhagen, Denmark. Frantz Nehammer is president of the new company. Gmo. Verduzco & Co., Avenida, Jaurez, is the Mexican representative for the company.



One of the motor lorries photographed outside Electric House, Westminster, on Saturday. These are being used to help relieve the shortage of motor buses, which are at present inadequate

FOUNDRY COMPANIES MERGE

CLEVELAND, June 22—The Acme and the Palmer & De Mooy Foundry Co. have been merged into a $400,000 company and will operate under one roof at the Acme Foundry Co.'s plant after July 1. The Acme plant will be enlarged and new machinery installed. The Palmer & De Mooy Foundry Co. was organized 37 years ago. For a number of years it has been under the active management of W. B. Greene, secretary and treasurer. The Acme Foundry Co. was organized 20 years ago and has been managed by William Greenbaum, secretary, since its organization. The new company will be under the management of W. B. Greene who will act as president of the concern.

DEFIANCE MACHINE EXPANDING

DEFIANCE, OHIO, June 24—Work on the new foundry building of the Defiance Machine Works is about to start. The company will make other expansions rapidly. It is hoped to have 300 additional men at work in the shop by the middle of July. To accommodate the new workers, Defiance is preparing to start a home-building campaign. There is a great shortage of homes here.

ENGINEERING CO. CAPITAL

MOLINE, ILL., June 20—The capital stock of the Root & Van Dervoort Engineering Co. has been increased from $1,346,200 to $7,500,000. Of the issues under the new capitalization, $2,500,000 is to be common and $5,000,000 in the form of 8 per cent preferred stock. Increased capitalization will in no way affect control of the business. The board of directors will be increased from 7 to 9 members. The new capital will enable the company to increase its manufacturing facilities. New model cars are being developed.

AMERICAN RIM PARTS SCARCE

LONDON, June 18—Frequent satisfied inquiries for replacement of parts from a large number of users of American cars equipped with Stranweld or Baker detachable rims show that these lines are inadequately represented in Great Britain.

ROBINSON INITIAL PAYMENT

DETROIT, June 24—The Security Trust Co., trustee in bankruptcy, has sent to persons with approved claims against the Robinson Machine Co. checks covering an initial payment of 10 per cent. It is expected that a subsequent payment of a like amount will be made when the machine company's war contract claims have been closed up. The company's liabilities aggregated $175,000.

FOREIGN TRADE OPPORTUNITIES

WASHINGTON, June 20—The Bureau of Foreign and Domestic Commerce, Department of Commerce, has received requests for automobile or parts agencies of business from individuals and companies in foreign countries. For further information address the Bureau of Foreign and Domestic Commerce and specify the Foreign Trade Opportunity number.

Scandinavia—Automobiles and Accessories, motorcycles, hardwoods, drugs and chemicals. References. No. 29731.

England—"Scudders." Terms, payments against documents. No. 29607.

Australia—Automobiles and accessories No. 29609.

India—Cars, motorcycles, bicycles and all accessories; kerosene oil, engines, electric light sets and electrical accessories, lamps, fans, etc. General catalogs requested. No. 29653.

Calendar

SHOWS

Aug. 30-Sept. 6—Minnesota. State Fair.
Sept. 1-6 — Indianapolis, Ind. State Fair. Cars and Accessories, Indianapolis Automobile Trade Assn., John B. Orman, Manager.
Sept. 13-20—Cincinnati, O. Ninth Annual, Music Hall, Cincinnati Automobile Dealers' Assn., H. K. Shockley, Manager.
Sept. 15-20 — Springfield, Mass. Eastern States Exposition.
*Oct. 9-19—Paris. Grand Palais. International Automobile Mfrs. Congress.
Nov. 7-16—London. Olympia Motor Car Exhibition—Society of Motor Mfrs. and Trades.
December — Brussels. International Automobile Mfrs. Congress.
Jan. 3-10 — New York, N. Y. Grand Central Palace, National Automobile Chamber of Commerce, S. A. Miles, Manager.
Jan. 24-31—Chicago, Ill. Coliseum, Cars; Drexel Pavilion, Trucks; National Automobile Chamber of Commerce, S. A. Miles, Manager.
January — New York. International Automobile Mfrs. Congress.
February — Chicago. International Automobile Mfrs. Congress.
Feb. 23-Mar. 6 — Birmingham, Eng. British Industries Fair.

TRACTOR SHOWS

July 14-19—Wichita, Kan. Automotive Committee of National Implement Assn.
July 28-29—Columbus, O. Tractor show in charge of Prof. H. C. Ramower, head of agricultural engineering department of Ohio State University.
Aug. 1-2 — Piqua, O. Tractor show in charge of Prof. H. C. Ramower, head of agricultural engineering department of Ohio State University.
Aug. 18-22—Aberdeen, S. D. Sectional Tractor Demonstrations.
October—Ottawa, Ont., Can. Interprovincial Plowing Match and Tractor Demonstration.

CONTESTS

July 4—Hohokus, N. J. Dirt Track Event.
July 4—Tacoma, Wash. Annual speedway races.
July 4—Atlantic City, N. J.—Airplane races—Aeronautic Convention.
July 4—Sheepshead Bay, L. I. Speedway race.
July 19—Uniontown, Pa. Speedway race.
*Aug. 15 — Middletown, N. Y. Dirt track event.
*Aug. 22-23—Elgin, Ill. Road race.
*Aug. 23—Sheepshead Bay, L. I. Speedway race.
*Sept. 1—Uniontown, Pa. Speedway race.
*Sept. 20—Sheepshead Bay, L. I. Speedway race.
*Sept. 27—Allentown, Pa. Dirt track event.
*Oct. 1—Cincinnati, O. Speedway race.
*Oct. 4—Trenton, N. J. Dirt track event.
*Oct. 11—Danbury, Conn. Dirt track event.

*Tentative dates.
†Sanctioned.

CONVENTIONS

June 16-19—Detroit. American Society of Mechanical Engineers spring meeting, Hotel Statler.
June 23-28—Ottawa Beach, Mich. S. A. E. Mid-summer Meeting.
July 9-10—Buffalo. Motor and Accessory Mfrs. Assn. Mid-summer convention.
Sept. 22-24—Philadelphia. Annual Convention, National Association of Purchasing Agents. Bellevue - Stratford.
May 12-15, 1920—San Francisco. Seventh National Foreign Trade Convention.
January — Washington. Pan-American conference.

TRACTOR SALES IN CANADA

WINNIPEG, CAN., June 20—In 1906, 237 tractors were sold in western Canada. In 1907 the sales were 580. In 1908 the sales were around 660. In 1909 there were not quite 600, but in 1910 they went to over 1500 In 1911 something over 1700 were sold. In 1912, 3700; 1913, 4600; 1914, 4200; 1915, 4400, and in 1916 they barely passed the 5000 mark. In 1917, 6400 machines were sold, and in 1918 approximately 7300.

There were in use up to Nov. 1, 1918, in western Canada, 19,777 tractors. Of the number sold in 1918, 1115 were Fordsons. The gas tractors in use were divided as follows:

Saskatchewan	11,105
Manitoba	3,655
Alberta	5,017

There were up to the first of the year approximately 219,000 farms of 160 acres and over divided as follows:

Saskatchewan	99,341
Manitoba	67,490
Alberta	51,663

In Saskatchewan there were up to Nov. 1, 1918, 8.94 farms per tractor. In Manitoba there were 18.40 farms per tractor, and in Alberta 10.29 farms per tractor.

The value of farm tractors in operation in western Canada at the close of 1918 was approximately $26,000,000.

LABOR LEGISLATION

LANSING, MICH., June 18—Following is a synopsis of new labor laws and amendments passed during the 1919 session of the Michigan legislature and approved by the governor:

Equal pay for equal service regardless of sex; also to protect female workers in industry by forbidding their employment in an industry where the load is disproportionate to their strength, or in any employment where their morals are in jeopardy or their potential capacity for motherhood will be impaired.

Some of the features of the amendments of the working men's compensation law are the reduction of the waiting period from 2 weeks to 1 week, hospital and medical attendance increased from 3 weeks to 3 months, the minimum pay per week for disability increased from $4 to $7 and the maximum increased from $10 to $14, and disability for which compensation is paid extended from 300 weeks to 500 weeks, making the total that may be collected $7,000 instead of $5,000.

A commission will be created to investigate and report on the industrial conditions affecting labor, including wages, hours of labor, sanitation, safety and health, old age pensions and, in fact, the promotion of the industrial welfare of the state, and to recommend such legislation as will be of benefit to the industrial workers of the state.

Labor associations will be permitted to incorporate for the purpose of building a labor temple and to sell stock to individual members of unions eligible to affiliate with the American Federation of Labor.

Lien laws will be amended to give better protection to mechanics in the collection of wages due.

Joint resolution was passed submitting an amendment to the constitution giving the legislature power to enact laws relative to male labor.

TRADEMARK BUREAU

WASHINGTON, June 20—Plans are under way for the establishment of an International Trademark Registration Bureau at Rio de Janeiro, which will be similar to the Bureau at Havana, and will do for the South American countries what the Havana Bureau is doing for the North American Republics.

The Bureau at Havana enables merchants and manufacturers to deposit their trademarks in the North American Republics and secure protection thereby through one payment and one contract.

AUTO ACCIDENTS IN A. E. F.

PARIS, JUNE 23—That the great majority of automobile accidents are due to carelessness and lack of attention to recognized rules of the road is indicated by American Army statistics compiled during the period of active operations. Ambulances, which are the vehicles most entitled to speed while on the road, have the lowest percentage of accidents, being only 0.5 per cent of the whole. The proportions of accidents for the American Army in France during a period of 12 months are as follows:

Touring cars	67.0 per cent
Trucks	16.5 per cent
Sidecars	14.4 per cent
Unclassified	01.6 per cent
Ambulances	00.5 per cent

The big percentage of accidents among touring cars is attributed almost exclusively to the practice of driving on the horn.

PLAN PETROLEUM INSTITUTE

WASHINGTON, June 21—The establishment of a Petroleum Institute with headquarters here, to investigate the depleting stocks of petroleum and increasing export demands, and the possibilities of accelerating production, has been suggested by refiners at a meeting with Mark L. Requa, who has just resigned as Director General of the Oil Division of the U. S. Fuel Administration.

It was stated that the tremendously increased demands for petroleum, both domestic and export, are problems which will grow in the next few years, and must be solved by scientific production.

Mr. Requa stated that an institute offering means for co-operation of producers with the government, fostering foreign and domestic petroleum trade and promoting the interests of the industry in all its branches, would be lawful and of great importance. No definite steps have yet been taken.

AIRPLANE STATION

NEW YORK, June 23—I. M. Uppercu, president of the Cadillac-Detroit Automobile Co. and sole owner of the Aero Marine Plane & Motors Co., proposes to erect hangars and launching platforms on the New York and New Jersey shores of the Hudson, the former at Fort Washington Point, 177th Street, and the latter opposite 181st Street.

Mr. Uppercu has made proposals to the New York City authorities and to the Palisades Interstate Park Commission, which controls the Jersey shore, for the necessary leases.

In co-operation with other aircraft manufacturers expected to join his project, he contemplates holding demonstrations of flying boats, giving instruction in aviation and generally enlightening the public on air dynamics. Foreign as well as American manufacturers, he added, would be invited to participate.

FINANCE EXPORTERS

WASHINGTON, June 23—An amendment to the Federal Reserve Act that would make available a capital of $100,000,000 to finance export trade has been recommended to Congress by the Federal Reserve Board.

The amendment as recommended would permit any national bank to invest not more than 5 per cent of its capital and surplus in the stock of domestic corporations engaged in foreign trade. Under the present law only national banks having a capital and surplus of $1,000,000 may invest in such stock, though such institutions may use 10 per cent of their capital and surplus for such a purpose.

The proposed change will not only help foreign trade and restore normal conditions to the extent of actual investments by national banks, but the moral effect of the participation of national banks will be stimulating to trade and finance generally.

The change will be temporary, as national banks would be allowed to purchase stock in foreign trade corporations only until Jan. 1, 1921.

UNIFORM TRAILER LEGISLATION

NEW YORK, June 24—The Trailer Manufacturers' Association of America has drafted recommendations covering uniform legislation for the use of trailers, submitting the proposals to the committee in Washington which drew up the uniform traffic bill for introduction into state legislatures.

The draft, pointing to the value of trailer usage in reducing highway freight costs, urges lower license fees for trailers than for trucks, owing to their lesser destructive tractive effect on the roads; repeal of laws prohibiting trailers or more than one trailer to a motor vehicle; changes in state regulations to permit greater gross weights for trucks and semi-trailers than for trailers alone owing to greater distribution of the weight, and to allow greater weights per inch width of tires than in the case of self-propelled vehicles.

Omaha-St. Louis Air Mail Service

WASHINGTON, June 23—Air mail service from Chicago to Omaha and St. Louis is planned to commence in the Fall. It is expected that this service will reduce mail delivery between the Atlantic and Pacific coasts by 16 to 24 hours. Consecutive trips of 325 miles have been made between Cleveland and Chicago without delays, forced landings or engine trouble of any sort, according to reports just made public.

The flights have been made in weather, which a short time ago would have been regarded prohibitive. The planes carry 400 lb. of letter mail daily, and as letters range from 40 to 45 a pound this means that 16,000 letters were transported on each trip. Notwithstanding the weather and the heavy loads, the postal planes, which are the L.W.F.-De Havilands, equipped with Liberty engines, maintain an average speed of 98.5 m.p.h.

Twelve of the L.W.F.-De Havilands are in the Cleveland service, four being stationed at each terminal and four at Bryan.

Some Interesting Time Results

The service shows some interesting time results. Short as this link is in comparison with a transcontinental line, Pacific Coast mail is already advanced 16 hours to Boston and New England points. Pacific Coast mail, routed via airplane link, is delivered in New York in the morning instead of the afternoon.

Westbound, a similar saving is achieved by taking the mail from the 7 a. m. express at Cleveland, transferring it to the postal plane and carrying it on to Chicago at almost double the speed of steam transportation.

From now on, the mail planes will leave Chicago for the East at 2.30 p. m. It was found that 151 great business concerns sent special messenger mail each noon in an effort to catch the two fast mail trains to the Atlantic seaboard. This meant that much of the correspondence had to be completed the night previous. The 2.30 airplane service means that often 8 hours to an entire day is saved and even in the case of the special messenger delivery to the train, from two and a half to three hours are saved.

Operation of the air mail between Cleveland and Chicago has been the means of relieving rail congestion, and one distributing car each way each day has been cut from that division. Distribution of airplane mail is done in the postoffices. This means that $52,000 yearly is saved, while at the same time, rail equipment is released for service elsewhere and mail expedited.

The Department is able to state that experiments are now being carried on looking toward the delivery and taking aboard of mail bags while the airplane is in flight. It is not so many years since it was thought remarkable for a fast steam train to accomplish this feat. It is now regarded as possible for the lightly loaded "ships," those carrying 1000 lb. of mail or less, to come close to the earth and snatch bags from specially prepared apparatus. In the case of the large multi-motored "ships," for which the Department shortly will let bids, no attempt will be made to come near the ground, but a scheme is proposed for dropping mail and possibly taking on from the roofs of buildings. If this proves practicable it will be possible on the New York-Washington route to make non-stop runs, serving both Philadelphia and Baltimore, and eliminating 15 min. stops at each place.

Another interesting development which it is now possible to announce is the construction of fireproof walls between the mail compartment and the engine and the compartment and the gas tank. A fireproof, airtight bag exactly the size of the compartment will be installed and within this a second fireproof bag containing the mail pouch. In this manner, tests have demonstrated danger of destruction by fire is practically eliminated.

BRAZIL AVIATION PLANS

WASHINGTON, June 21—The government of Brazil has issued a decree giving permission to two citizens of that country to use airships for the transportation of passengers and merchandise between the principal cities of Brazil. The concession is not exclusive and the service must be inaugurated within two years. The concession allows the transportation of passengers and merchandise with the understanding that all mail is to be carried gratuitously, it being understood, however, that no mail is to be transported unless it has been duly stamped by the National Post Office.

The number of voyages and passenger and freight rates will be subject to control of the Brazilian government. The regular service of transporting passengers and merchandise cannot be initiated without prior license from the government, which will regulate all conditions. The owners of the airships obligate themselves to admit apprentices of the National Aviation School on their airships and in their shops. In case of war the government has the privilege of taking over the service.

OLYMPIAN SELLS WAR MATERIAL

PONTIAC, MICH., June 24—War material which was to have been used in the manufacture of aerial drop bombs by the Olympian Motor Co. will be sold at auction June 27. The material consists of sheet steel, steel stampings, steel tubing, brass rods, steel rivets, wire brazing brass, welding iron wire, wire solder, coated nails, wrought staples, cotter pins and hemp rope. The sale will be for cash to the highest bidder. The material has been divided into separate lots upon which individual bids may be made. It will be conducted under the auspices of the United States Navy. Bids will be open at 10 a. m. More than 3000 aerial drop bombs were made by the Olympian company.

SHIPMENTS TO DENMARK

WASHINGTON, June 23.—Shipments recently gone forward to Denmark should have been consigned to actual consignees instead of the Merchants' Guild of Copenhagen or to the Danish Chamber of Commerce, as was done, according to a report of the War Trade Board.

In view of the fact that consignment to these associations causes inconvenience to the associations and delay in releasing the goods to the actual consignees, instructions have been issued to the Collector of Customs to permit shipments to Denmark only when the commodities are consigned directly to the actual consignees.

The attention of exporters is further directed to the War Trade Ruling 784, issued June 18, 1919, giving the details of Special Export License RAC-81, permitting the shipment of nonconserved commodities to Denmark.

GERMAN SCIENTIFIC BOOKS

WASHINGTON, June 21—The War Trade Board will consider applications for licenses to import into the United States from Germany or elsewhere, scientific books and journals which were printed in Germany. Licenses covering such importations will not, however, be issued until the importer in the United States has made effective arrangements to make the purchase price of such books or journals available for the purchase of foodstuffs for Germany.

TIRE FACTORY IN MEXICO

WASHINGTON, June 21—A tire company has been organized under the name of the Fomenot de Comercia Internacional, S. A. (International Commerce Exchange), in Mexico City, to manufacture rubber tires and tubes. It is a private enterprise according to Vice Consul McEnelly, with an investment of $350,000, employing 110 men at present and with capacity for 350. The plant is modern and operated by electricity and oil for fuel. It is turning out 25 tires and inner tubes daily.

PANHARD FOREIGN BUSINESS

GRAND HAVEN, MICH., June 24—The Panhard Motors Co. is pushing its foreign business and has closed contracts in England, India, Sweden, Finland, Denmark, Brazil, New Zealand, Japan, and China.

SINGLE STATE TAX FAVORED

WASHINGTON, June 20—A petition, favoring the bill introduced by Congressman Fuller, providing that anyone found qualified to operate an automobile in one state will not be obliged to make additional registration or take out additional licenses or pay additional taxes when traveling on pleasure or business in other states, was filed with Congress this week by the National Automobile Dealers' Association.

The bill provides that the certificate of local officers of a state should be accepted in all states of the country as competent and sufficient evidence that the owner has complied with the laws and regulations of his residential state. It was referred to the Committee on Interstate and Foreign Commerce as it is intended to regulate the interstate use of automobiles and all "self-propelled" vehicles using public highways for interstate commerce.

AIRPLANES FOR SALE

DETROIT, June 24—The Thompson Auto Co. has purchased 20 Curtiss airplanes from the United Aircraft Corp., New York, and is introducing them with a canvas sign announcing "Airplanes for Immediate Delivery."

EXPORT CO. DIRECTORATE

NEW YORK, June 24—Gaston, Williams & Wigmore, Inc., exporters of automobiles and other commodities, added the name of John W. Prentiss to its directorate at the recent annual meeting. Other directors are Charles H. Sabin, George A. Gaston, George M. Dahl, Harry Payne Whitney, Charles A. Corliss and James J. Phelan. Mr. Sabin, president of the Guaranty Trust Co., is chairman of the board.

The net income for the year ending April 30, was $1,262,401, and dividends aggregated $1,050,000.

NEW MACHINE SHOP

BOUND BROOK, N. J., June 23—The Bound Brook Oil-less Bearing Co. is having a 2-story office building and machine shop erected, 100 by 180 ft., of concrete and steel. By the addition of this building, the entire factory will be located at one point.

NEW TREATY WITH PANAMA

WASHINGTON, June 20—A commercial treaty between the United States and Panama, ratified to-day by the Senate, facilitates the development of commerce and the work of traveling salesmen.

Manufacturers, merchants or salesmen can operate as commercial travelers in either country if a resident of one, upon the payment of a single fee for a license which will be valid in all of the territorial jurisdiction of the country. To secure a license the applicant must file a certificate secured from the country of residence of the employer declaring him to be a commercial traveler. Samples may be sold without securing a special importer license. Samples without commercial value will be admitted free of duty, and those having a commercial value will be admitted under bond for lawful duties if not withdrawn within 6 months after entrance.

All customs formalities are to be simplified to avoid delay in the dispatch of samples. No license will be required of anyone traveling to study trade even though they initiate commercial relations, provided they make no sales.

AMERICAN BRANCHES IN MEXICO

WASHINGTON, June 23—Reports from the Vice-Consul at Mexico City indicate the need for establishing branches of American automobile manufacturers in Mexico. Large numbers of sales have been reported, but complaints are made by buyers that poor service is tending to ruin the reputations of many high-class passenger cars.



The accompanying illustration is of a photograph taken nineteen years ago, in front of Rhode Island's first "Horseless Carriage" factory in Providence, and operated by Hughes & Atkin. Now known as the Wm. Hughes Company, the oldest exclusive Reo car dealer in New England, having taken on the Reo line some thirteen or fourteen years ago. The "Horseless Carriage" as shown here is one of the eighteen built by Mr. Hughes in 1899 and 1900, the first in New England, for which he made nearly all parts by hand. As late as thirteen months ago one of these cars was seen operating on the highways of Rhode Island



In Keeping With Good Cars

Keen competition demands that every item you put into your cars be the best of its kind.

RUSCO BRAKE LINING, CLUTCH FACING,

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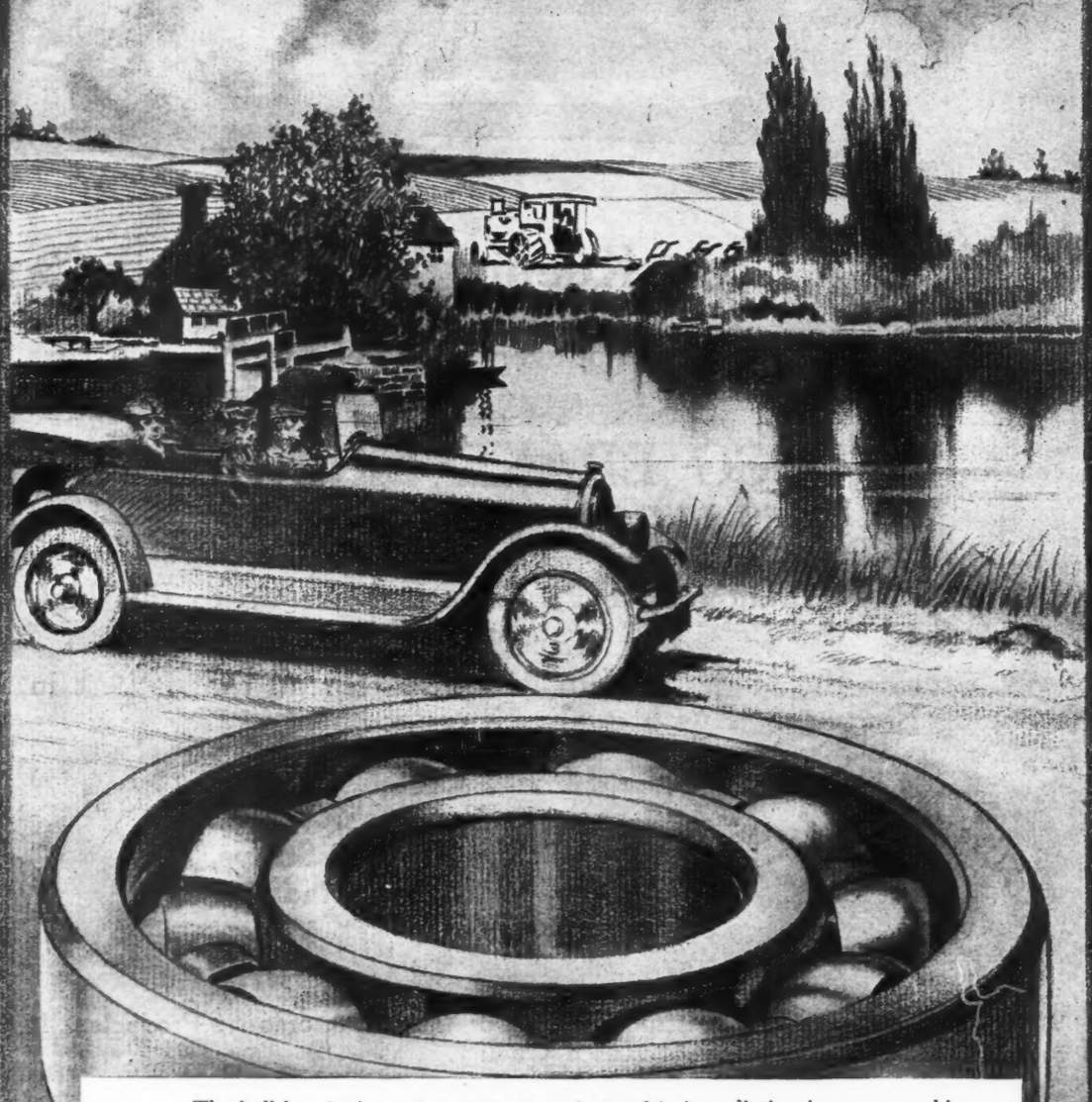
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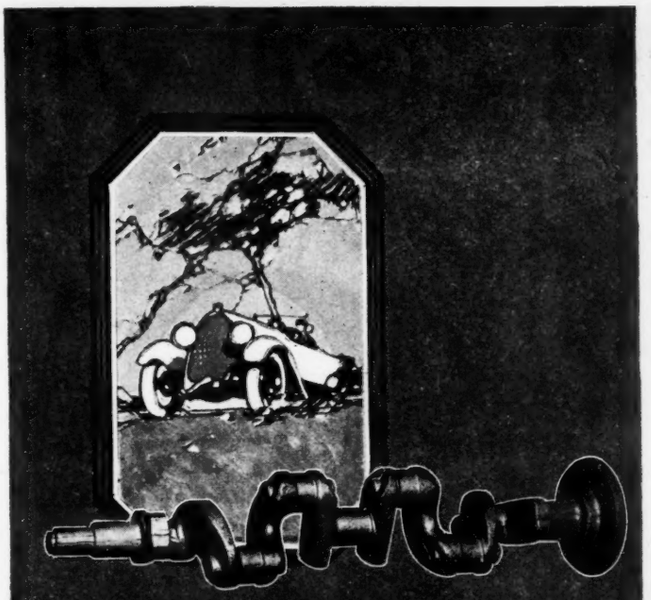
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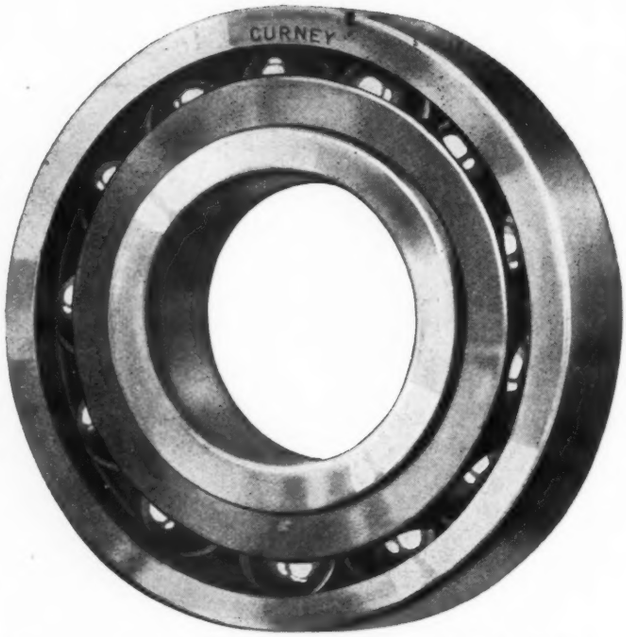


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Simplicity

Gurney Ball Bearings simplify machine design because both radial and thrust loads are carried on a single bearing, on a single row of balls.

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GURNEY
BALL BEARINGS

GURNEY BALL BEARING CO.
Conrad Patent Licensee
JAMESTOWN, N. Y.

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Gradually the industrial effort in this and other countries is working round to the peace requirements and adjusting itself to the after war period of industry. The demand for raw materials, metals, etc., is beginning to move and there are signs of an export revival in these lines. Construction is being started in housing and some of the larger building problems. In the automotive field the market is still ahead of the production and the outlook for progress in this field is excellent.

It is probable that the economic changes brought about by the war and realized as of great importance in this post war period will demand keener attention in merchandising and advertising and in all problems having to do with distribution of goods. As in selling so in advertising, the most profitable line of development is the shortest line of attack between the manufacturer and the most important buyers and users of the product.

"AUTOMOTIVE INDUSTRIES" offers a direct line between those who have products to sell to the manufacturer of automotive equipment and the manufacturer who must use them.

Babbitt-Faced SHIM

Inaugurates a New Era in Bearing Efficiency

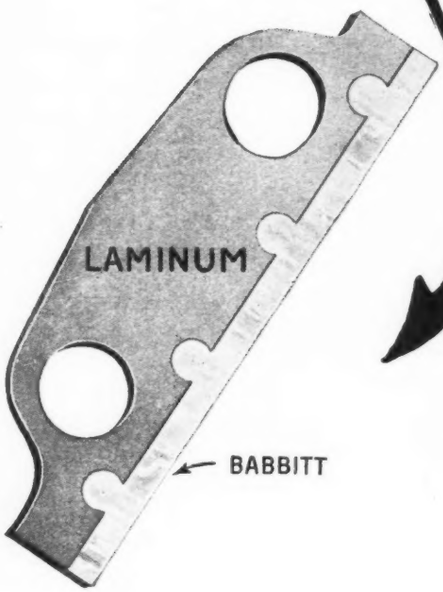




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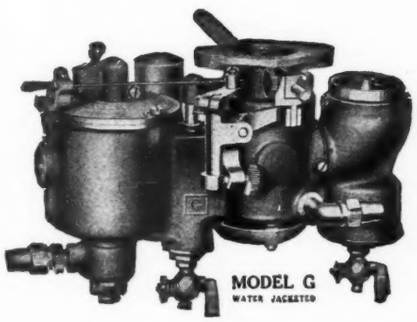
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Successors to Findeisen & Kropf Mfg. Co.
2100 Rockwell Avenue CHICAGO, ILLINOIS



Axle Housings that combine the qualities of Rigidity, Strength and Light Weight have been made possible only through Bossert Facilities.

Plus Rigidity Minus Weight

WEIGHT saving is a big efficiency factor to consider, in truck, tractor or car practice. In the Bossert Pressed Steel Axle Housing this weight economy finds its highest expression. It is accomplished at no expense of rigidity or strength.

Whether in axle housings, or the 200 odd other pressed steel parts, quality regardless of production cost is maintained. To this adherence to an ideal we attribute our growth and prestige among makers of high charactered automotive products.

From small parts to axle housings this high standard is maintained in both material buying and production.

This, the largest plant of its kind in the world, is the best equipped. Its factory personnel is the most highly specialized. Its engineering departments the most capable.

It follows, then, that "The Bossert Way" offers quality products at moderately consistent prices, and that its facilities for quick work and delivery leave nothing to be desired.

Our engineers will show you where pressed steel parts will replace drop forgings, steel and malleable iron.

THE BOSSERT CORPORATION

Utica **New York**

BOSSERT

With Infinite Care!



MAN and machine, they work with infinite care—The man because he has been trained for a lifetime in tasks requiring the utmost exactness—The machine because it is made by Billings & Spencer for their own use, and for the use of other drop forgers of reputation.

This trimmer miller of improved design quickly and cleanly mills the irregular outlines of trimming press dies, and at the same time their necessary draft or clearance. It also cuts the flash from drop forgings, and mills cutting dies of all descriptions for press work.

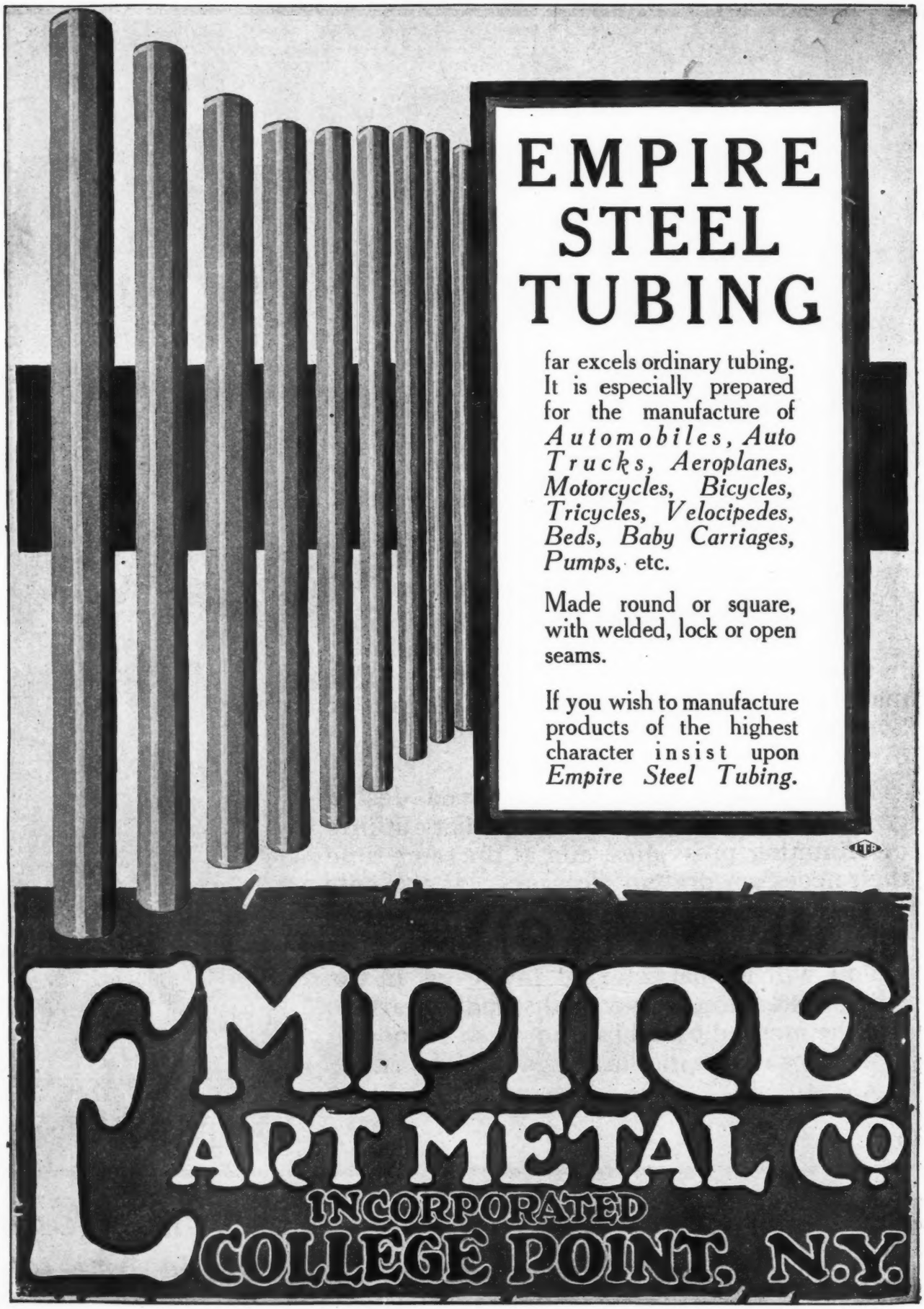
You will be particularly interested in the oiling system for the vertical spindle bearings and the method of chip disposal so as not to interfere with the moving parts of the machine.

Full details upon request.

RELY ON ME!

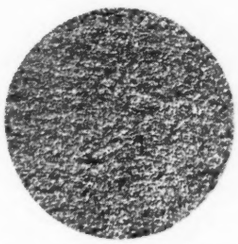
The Billings & Spencer Co., Hartford, Conn.

"The First Commercial Drop Forging Plant in America"


EMPIRE
STEEL
TUBING
far excels ordinary tubing. It is especially prepared for the manufacture of *Automobiles, Auto Trucks, Aeroplanes, Motorcycles, Bicycles, Tricycles, Velocipedes, Beds, Baby Carriages, Pumps,* etc.
Made round or square, with welded, lock or open seams.
If you wish to manufacture products of the highest character insist upon *Empire Steel Tubing.*
EMPIRE
ART METAL CO.
INCORPORATED
COLLEGE POINT, N.Y.



HOFFMAN PROCESS



Indications and record of the temperature at which Hoover balls are heat treated insures fine grained structure as shown above. This, of course, results in the production of a ball of maximum durability.



Failure to make positive that control as mentioned above may result in the coarse grained and weak structure as illustrated. A ball of such structure is apt to fail even under normal strains. Avoiding defects of this nature is one of the functions of the Hoover Research and Control Laboratories.

Hoover Testing Methods Remove Hoover Balls from the Domain of Chance

There is never an opportunity for a doubt concerning the finished quality of Hoover Steel Balls.

That is because "Research" establishes Hoover specifications—and "Control" sees that they are carried out.

By "Research" we mean the careful tests and investigations which are made in the Hoover laboratory to establish definite standards for the steel, the oils and greases, the grinding and polishing wheels, the abrasives and other materials which are used in the manufacture of Hoover Steel Balls.

By "Control" we mean the daily routine tests also made in the Hoover Laboratories —to see that there isn't the slightest deviation, either in materials or manufacturing methods, from the specifications which have been been so rigidly laid out.

As the backbone of the great Hoover plant, the Hoover Research and Control Laboratories labor unceasingly to maintain the well known superiority of Hoover Steel Balls. The result is a product as perfect as it is possible to manufacture.

As the largest steel ball plant in the United States we are prepared to meet practically any shipping specification which may be submitted to us.

HOOVER STEEL BALL COMPANY
ANN ARBOR, MICHIGAN

HOOVER
STEEL BALLS

FAY AUTOMATIC LATHE

Machining Tractor Pulleys

We here present a method which gives a balanced, curved-crown, finely finished pulley at a less cost than you are paying for rough-turned ones.

FIRST OPERATION

Finish hole and one end of hub in Hartness Flat Turret Lathe—a small diameter, high-speed job.

SECOND OPERATION

In Fay Automatic Lathe. Back tool holder rough turns inside rim on one side, and rough turns outside of rim to center. Front tool holder does same for other side.

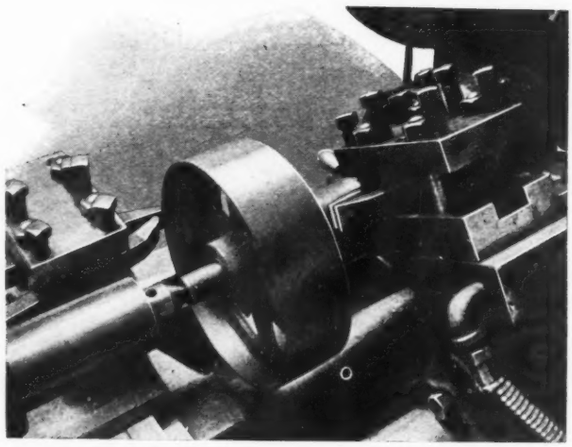
Rim is Rough-turned Inside and Out in Time it Takes Engine Lathe to Turn Halfway Across Face.

THIRD OPERATION

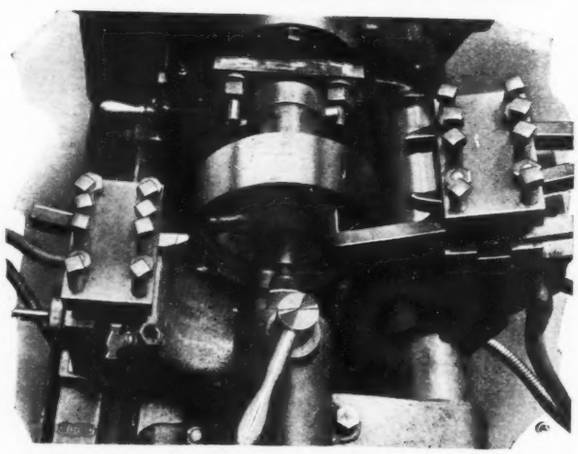
In Fay Automatic Lathe. Front tool turns double taper or curved crown as required. Back tool holder faces two sides of rim and unfinished hub. One man runs both machines. He has three arbors, changing the work on one while the other two are in machine.

He Completes All the Cuts in the Second and Third Operations in the Time It Takes to Finish Turn Across the Face Only.

Capacity of Fay Automatic Lathes regular equipment for pulleys up to 12″ dia. 10″ face; with special carriage, for pulleys up to 16″ dia. 9″ face.



SECOND OPERATION
Rough turning outside diameter and inside of rim on both sides

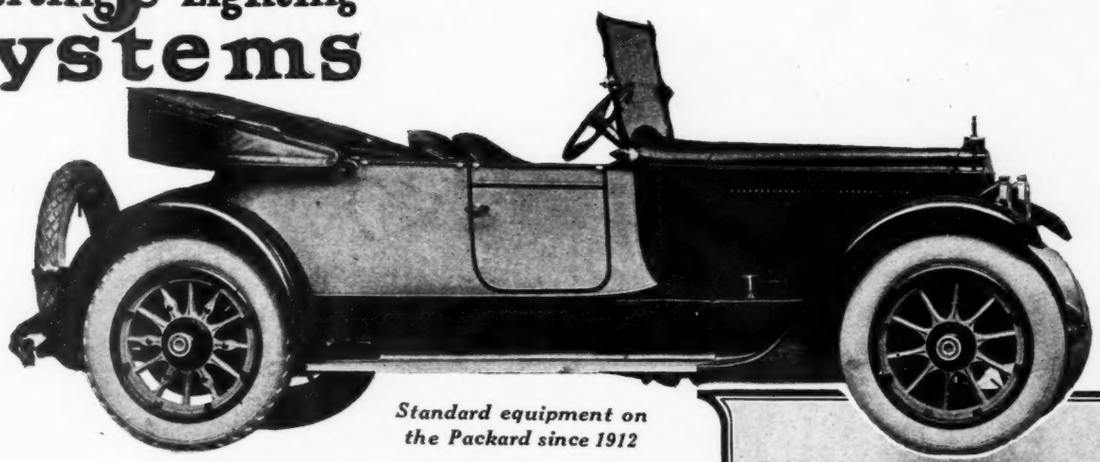


THIRD OPERATION
Turning double taper or curved crown and facing two sides of rim and unfinished hub.

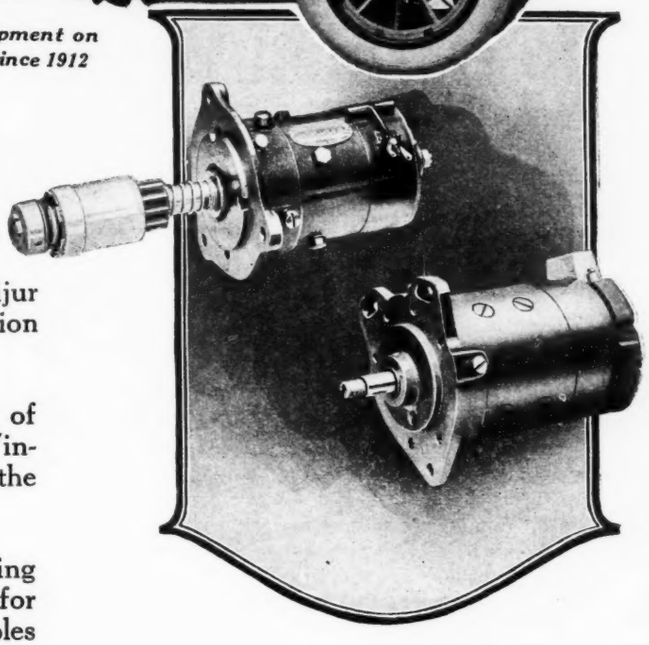
JONES & LAMSON MACHINE CO.
SPRINGFIELD, VT.

503 Market St., San Francisco, Cal. 109 Queen Victoria St., London, E. C. France, Spain and Belgium: F. Auberty & Co., 91 Rue de Maubeuge, Paris. Holland: Spliethoff, Beeuwkes & Co., Rotterdam. Japan, Korea, etc.: Mitsui & Co., Ltd., Tokio. Australia: McPherson's Pty., Ltd., 554 Collins St., Melbourne.

Bijur Starting & Lighting Systems



Standard equipment on the Packard since 1912



On Fine Cars the Bijur System Is an Assurance of Dependability

THE quality of the cars which use the Bijur Starting and Lighting System is an indication of merit.

Beginning with the Packard in 1912, adoption of the Bijur System has extended to the Marmon, Winton, Apperson, Jordan, King, Roamer and the Peugeot of France.

Besides meeting the requirements for the leading passenger cars the Bijur System has been adopted for use on motor trucks, air and sea planes, dirigibles and tanks.

The Starting of DePalma's 150 mile an hour Packard was not too heavy, the transatlantic flight of the NC Planes was not too far, and the design of the Bijur Starters is such that no application can be too small for the Bijur System to meet effectively.

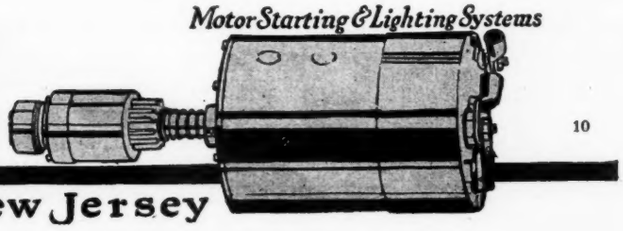
Bijur Engineers are prepared to discuss plans and suggest designs for the incorporation of the Standard Bijur System to any form of automotive starting and lighting duty.

THE BIJUR LIST

Apperson	Roamer
Atlas	Templar
Commerce Truck	Winton
Grant	Curtiss Aeroplane Co. The "Oriole"
Jordan	U. S. Army and Navy
King	NC Planes
Marmon	C Blimps
National	Tanks
Packard	
Peugeot of France	

Bijur Motor Appliance Company

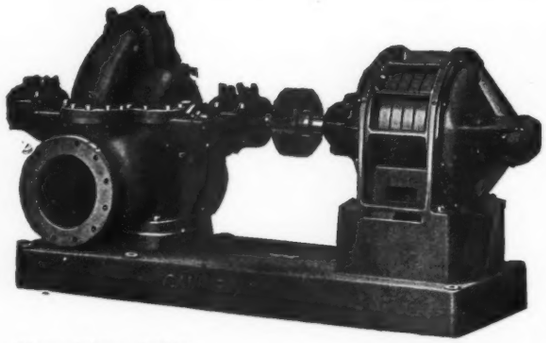
Motor Starting & Lighting Systems



10

Hoboken New Jersey

CAMERON PUMPS



Motor-driven double-suction volute pump.

On Hospital Duty

Here is what the chief engineer thinks of the Cameron—

Hospital St. Boniface,
St. Boniface, Man.,
March 4, 1919.

Canadian Ingersoll-Rand Co.,
Montreal, Quebec.

Dear Sirs—Regarding two Cameron Class DV volute type pumps furnished by your people to the hospital, I am pleased to say they are giving good satisfaction. They have been pumping 250 gals. P. M. against a head of 160' for as long as 11 months without a shutdown. They are still running without noise or repairs of any kind. No. 1 is direct connected to steam turbine and running 2500 R. P. M. No. 2 is a duplicate of No. 1, except the latter is electric-motor driven. I can recommend the Cameron Pump to any firm wishing a real pump to do real work, as we forget to notice our pumps unless some person wishes to see them running.

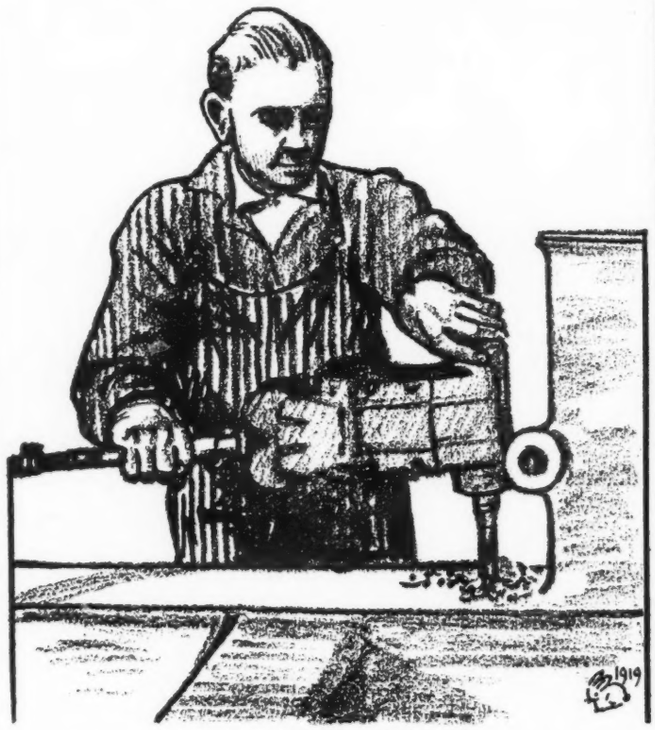
Yours sincerely,
GEO. K. BEERS,
Chief Engineer.

The Cameron line is complete and contains pumps for nearly all uses and sizes to suit every requirement. Send for Bulletins 7150, 7204.

49-DV

"LITTLE DAVID"

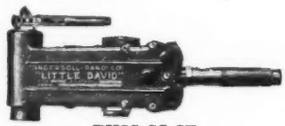
Close Quarter Drill



The position of the spindle in a close-quarter drill brings up special problems in the design of the tool. In the "Little David" these have been solved in a most satisfactory way.

The spindle is operated by ratchets on three rocking levers, which are connected direct to the pistons. The levers also operate the crankshaft, the only function of which is to control the single rotary valve and the pistons on the return stroke.

The "Little David" is easier and cheaper to operate and repair and contains less than one half the number of parts of any other close quarter drill on the market.



THIS IS IT
Ask for Catalog 8000

PT-51-7

INGERSOLL-RAND COMPANY

GENERAL OFFICES, 11 BROADWAY, NEW YORK

DOMESTIC OFFICES

BUTTE, JUNEAU, DULUTH, DENVER, BOSTON, EL PASO, SEATTLE, ST. LOUIS, CHICAGO, NEW YORK, KNOXVILLE, SCRANTON, HOUGHTON, CLEVELAND, PITTSBURGH, BIRMINGHAM, LOS ANGELES, DETROIT, NEW ORLEANS, PHILADELPHIA, SAN FRANCISCO, SALT LAKE CITY, JOPLIN

FOREIGN OFFICES

LONDON, PARIS, MADRID, MILAN, RIO DE JANEIRO, MONTREAL, MEXICO CITY, MELBOURNE, KALGOORLIE, JOHANNESBURG, SANTIAGO, CHILE, LIMA, PERU, KOBE, JAPAN, MANILA, TOKIO, HONOLULU, HAVANA, BUENOS AIRES, ANTOFAGASTA, LA PAZ, BOLIVIA, VANCOUVER, B. C.

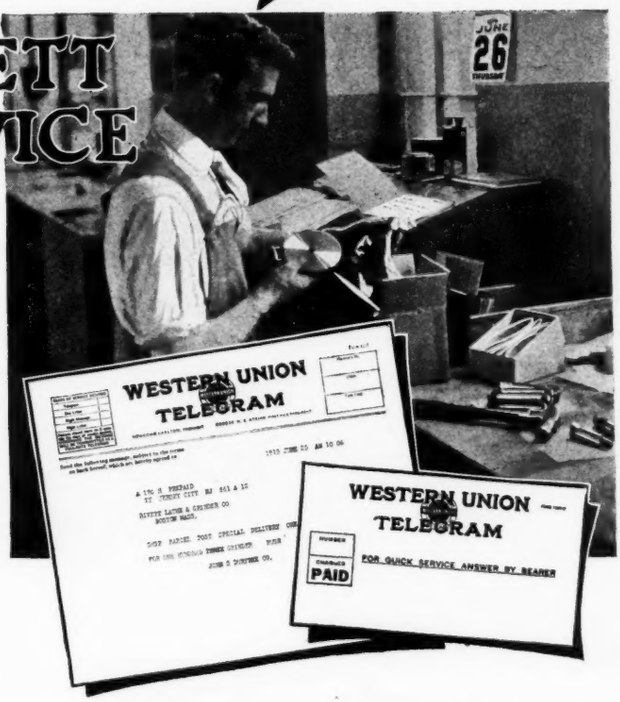
APPLY TO NEAREST OFFICE

"A quality that extends to every part of every Rivett Product and is reflected in the work they do."

RIVETT Quality RIVETT Service

"A never-enaing service in promptly supplying repair parts and operating assistance when needed insures the profitable performance of Rivett Products from the day they enter your shop"





Operating Assistance

Rivett Service starts when a Rivett machine enters your plant and continues throughout its long life. To insure the maximum production and dependable accuracy of your work, we lend every possible aid in the way of operating assistance, teaching your men to operate in a way that will insure maximum profits from each machine.

Repair-part Service

The far-seeing manufacturer, shop superintendent and foreman will appreciate our prompt repair-part service, that important part of Rivett Service, which begins when a Rivett machine enters your shop and continues throughout its long life.
No long, profit-eating delays waiting for Rivett Parts.

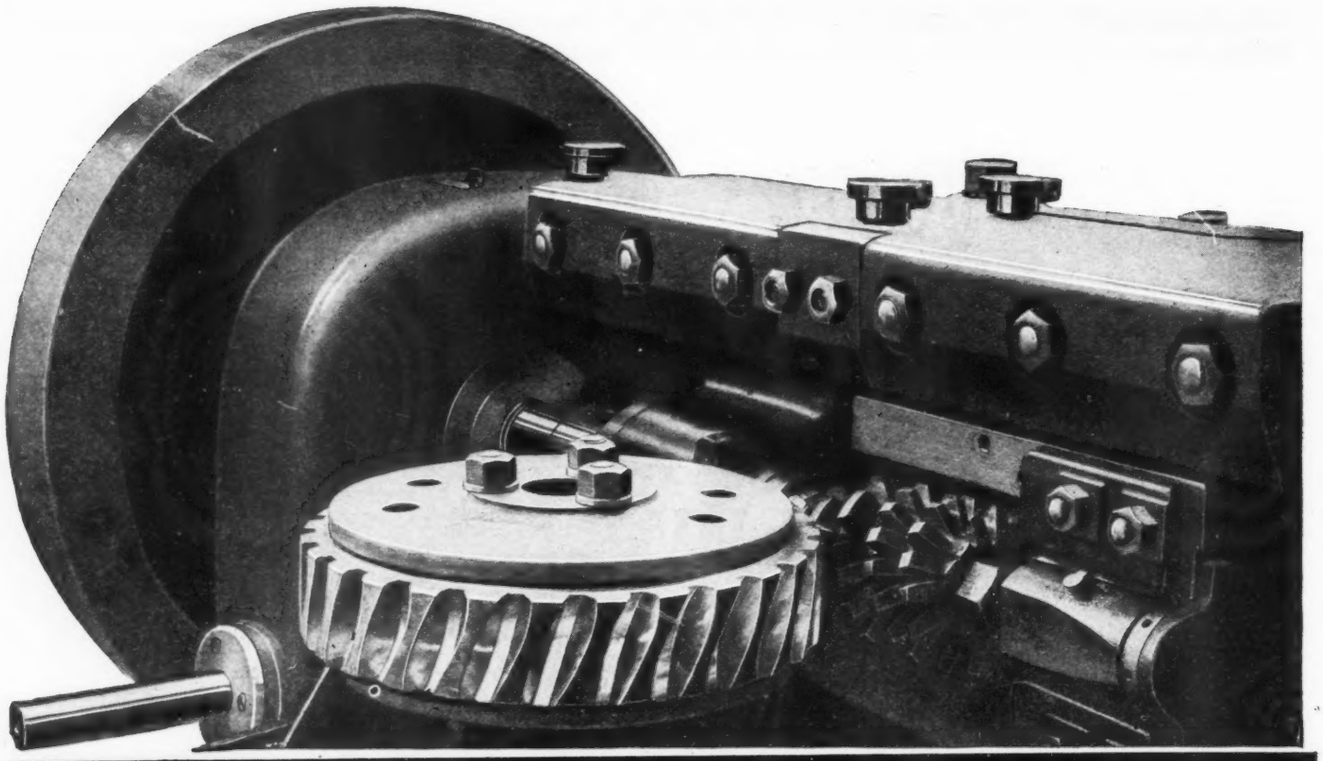
RIVETT

INTERNAL GRINDERS No. 103 — No. 106 **RADIAL GRINDER No. 205**
PRECISION LATHES Nos. 504-505 — 606-608 — 609 — 705

Our catalog should be on your desk. Your request will put it there

RIVETT LATHE *and* GRINDER COMPANY
BRIGHTON DISTRICT *of* BOSTON, MASSACHUSETTS
"MAKERS OF THE WORLD-KNOWN RIVETT PRECISION LATHE"

DOMESTIC AGENTS: The Fairbanks Company, Boston, Mass.; Purinton & Smith, Hartford, Conn.; Patterson, Gottfried & Hunter, Inc., New York City; Homer Strong, Rochester, Buffalo, Syracuse and Albany; D. Nast Mchy. Co., Philadelphia, Pa.; Somers, Fitler & Todd Co., Pittsburgh, Pa.; Cleveland Tool & Supply Co., Cleveland, Ohio; The E. A. Kinsey Co., Cincinnati, Ohio, Indianapolis, Ind.; J. R. Stone Tool & Supply Co., Detroit, Mich.; Dale-Brewster Machinery Co., Chicago, Ill.; F. E. Satterlee Co., No. Minneapolis, Minn.; Hallidie Mchy. Co., Seattle, Wash.; Hendrie & Bolthoff Mfg. & Sup. Co., Denver, Colo.; Portland Mchy. Co., Portland, Ore.; Smith-Booth-Usher Co., Los Angeles, Cal.; F. O. Stallman Supply Co., San Francisco, Cal.; Utah Mchy. Co., Salt Lake City, Utah.
FOREIGN AGENTS: H. W. Petrie, Ltd., Toronto, Canada; Fenwick Freres, Paris, France, Belgium, Switzerland, Italy, Spain, Portugal; Buck & Hickman, Ltd., London, Glasgow, Manchester, Sheffield and Birmingham; A. B. Gales, Ltd., Stockholm, Sweden.



Too Good to Talk About

We aren't quoting the production figures the GOULD & EBERHARDT Worm Wheel Generating Machine made on the job illustrated above—they are almost too good to be true.

Send us your blue prints and we'll tell you what **you** can do with a

GOULD & EBERHARDT WORM GEAR GENERATING MACHINE

It doesn't make any difference if the hob is **straight**, necessitating an "in" feed, or **tapered,** necessitating a tangential feed.

The G & E does the work quickly, accurately, efficiently.

For conducting experiments the G & E uses a fly-tool instead of special hobs for every wheel.

Better send along those blue prints today!

GOULD & EBERHARDT

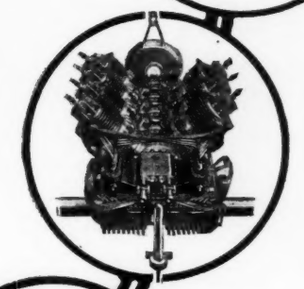
"HIGH DUTY" SHAPERS
AUTOMATIC GEAR AND RACK CUTTING MACHINERY

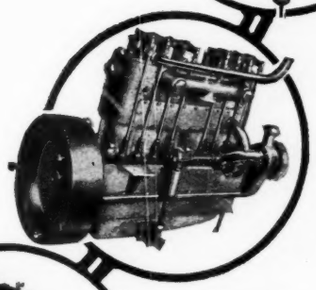
ESTABLISHED 1833 NEWARK, N.J. U.S.A.

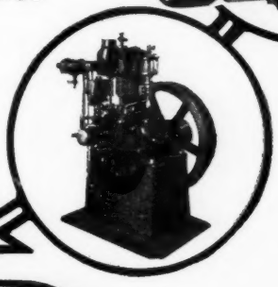


TAKE IT TO TAFT-PEIRCE









The Problems of the Automotive Industry

are like the problems of every industry in the Nation's great fields of achievement. Many of the problems of the automotive industry have been taken to Taft-Peirce. The Taft-Peirce organization has developed or co-operated in the development of countless machines and tools (from the typewriter to heavy machinery), involving exceptional ingenuity and requiring great engineering experience and ability.

If you have a designing or manufacturing problem, let the cumulative experience of the Taft-Peirce organization help you solve it.

Taft-Peirce Automotive Engineering Experts Are at Your Service.

TAFT-PEIRCE
Woonsocket, R.I., U.S.A.

New York: Woolworth Building 2076 Detroit: Majestic Building

Mighty in strength



Lewis-Baker Springs Have Greater Resistance Longer Wearing Qualities

LEWIS-BAKER process of spring making not only eliminates the old bugbear—the dangerous and harmful weakening effect of concealed fractures and "spotty" steel, but turns out a more perfectly formed and closer fitting leaf.

That's why they excel in rugged strength and longer service.

Let us furnish you price quotations on the wonderful Lewis-Baker springs made up especially to fit your requirements

Lewis Spring and Axle Company
Chelsea, Michigan

Made in a new way



Lewis-Baker Springs Rightfully Belong On Every Car in America

LEWIS-BAKER springs are better springs — incomparably better springs, made by a vastly better process which safeguards absolutely the original strength and super-fine elastic resiliency of the best spring steel from start to finish.

That's why they should be part of your cars standard equipment.

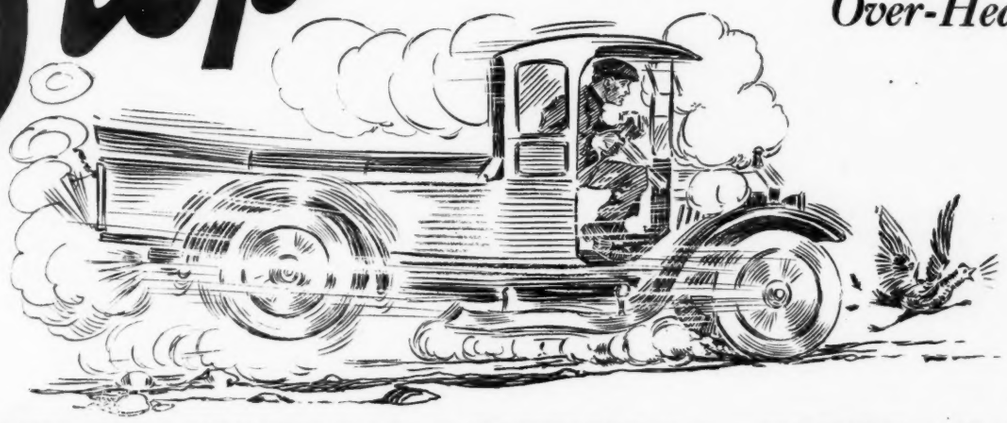
We are now prepared to make prompt deliveries of the new Lewis-Baker process made leaf springs, designed to meet your specifications

Lewis Spring and Axle Company
Chelsea, Michigan


INTERCHANGEABILITY
HARTFORD accuracy means absolute interchangeability. There is no loss of time in assembling when the turned parts are H. M. S. quality, for their accuracy is maintained by rigid and constant inspection.
When you deal with us you are assured of real service backed by a reputation of forty-three years, a factory of over 200,000 square feet floor space, vast resources of the highest type raw materials, and an efficient and highly-trained working force.
Our capacity ranges from the smallest size wire to six inches diameter. All H. M. S. products are milled from the solid bar, insuring maximum strength and accuracy.
Let us figure on your specifications, particularly if they are most exacting and difficult.
HARTFORD
MACHINE SCREW
COMPANY
HARTFORD, CONN.
New York - Detroit - San Francisco - Richmond, Va.

Stop

Over-Speeding
Over-Feeding
Over-Heating

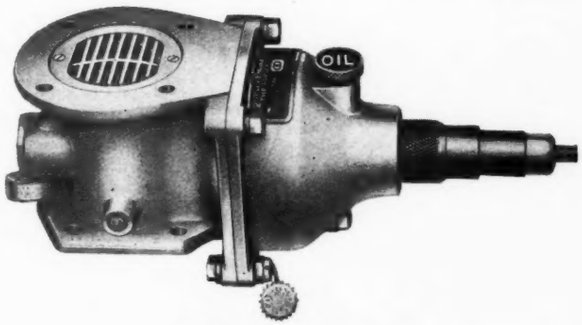


The SIMPLEX-UNIVERSAL GOVERNOR for FORDS will do it

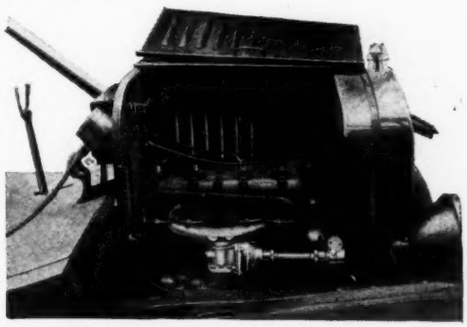
Saves	*Prevents*	*Insures*
GASOLINE	OVER-SPEEDING	AMPLE POWER
OIL	OVER-HEATING	INCREASED AVERAGE SPEED
TIRES	OVER-FEEDING	FEWER Repairs—LESS Depreciation
MOTOR	ABUSE	LONGER LIFE

Made Especially for Ford Trucks, Ford Commercial Delivery Cars, Make-A-Trucks and Make-A-Tractors.

WILL FIT ANY FORD ENGINE



THE SIMPLEX-UNIVERSAL GOVERNOR



SIMPLEX-UNIVERSAL Governor and Manifold Installed on Ford Engine

The Ford Motor will develop its maximum torque or pulling power at approximately 1100 revolutions per minute. The motor's maximum speed is about 2200 r. p. m. Think of all the extra gas and oil it is using in those excess 1100 r. p. m. without added power! Think of the vibration, wear and tear you can eliminate by governing the motor at 1100 r.p.m. with a SIMPLEX-UNIVERSAL Governor! Figure the saving in gasoline, oil, tires, wear, tear, and depreciation in dollars and cents.

Ask any Dealer to install a SIMPLEX-UNIVERSAL Governor on your Ford for ten days' free trial.

The DUPLEX ENGINE GOVERNOR CO., Inc.

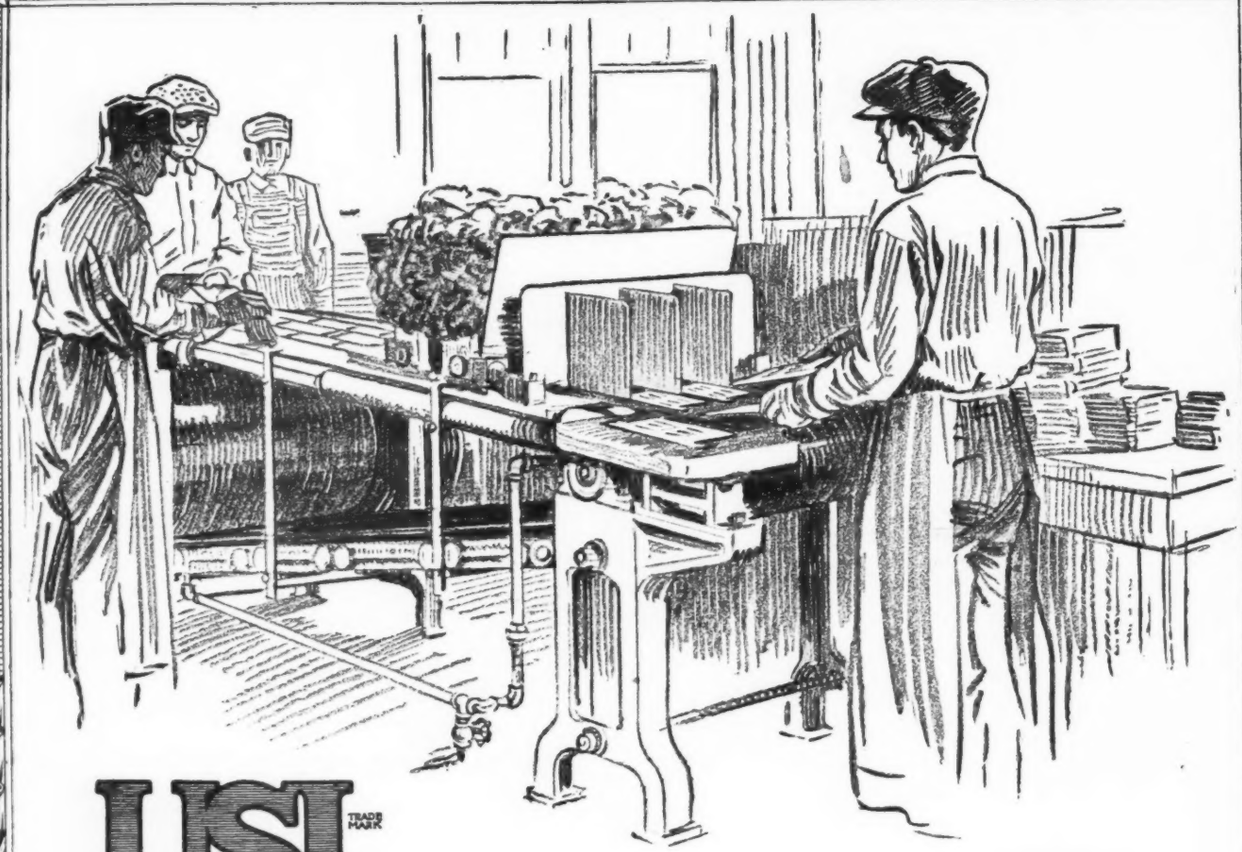
Manufacturers of DUPLEX and SIMPLEX PRECISION GOVERNORS for TRUCK and TRACTOR SERVICE

Main Office and Factory
42 Flatb sh - v nue Ex.ers'on

BROOKLYN, N. Y.

Branch Offices in CHICAGO, DETROIT, SAN FRANCISCO **SERVICE STATIONS IN ALL PRINCIPAL CITIES**

DEALERS: *Write or wire for Bulletin No. 110 and Discounts on this Big Selling Governor*



USL TRADE MARK
U.S LIGHT & HEAT CORPORATION

machine-pasted plates make possible our long guarantee

Our exclusive machine-pasting process of making battery-plates has greatly increased the life of the storage battery.

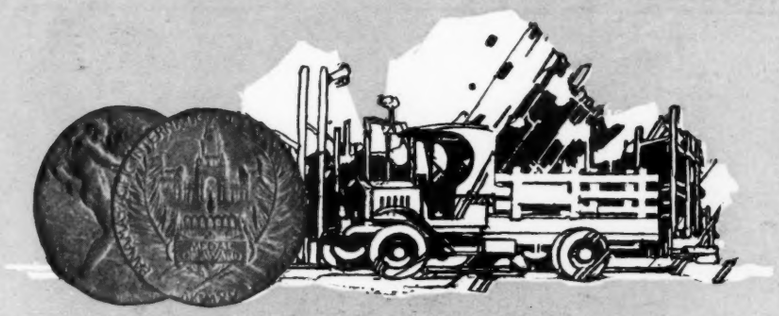
At the USL Factory, all uncertain hand-work has been done away with. USL battery-plate grids are placed in an ingenious machine and lead-oxide paste is quickly pressed in from both sides at once. This sets as a mass and the result is a compact, solid plate, uniform in density all the way through.

USL plates wear evenly, give off a constant and steady flow of power, do not crumble with vibration or road-shock and do not wash away.

As these long-life plates make a long-life battery, we guarantee the "USL" for 15 months on an adjustment-basis. Every USL Service Station stands ready to make good this guarantee.

DEALER'S—There's a USL story you will be interested in hearing. It tells you why the USL franchise in your territory is a valuable one. May we send it to you?

U. S. Heat & Light Corporation, Factory, NIAGARA FALLS, N. Y.
BRANCHES: New York Detroit Chicago Kansas City San Francisco Washington, D. C.



SHELDON AXLES ARE NOW TO BE ADVERTISED in a much more vigorous manner than ever before, through a campaign which will reach practically every source of demand for high grade motor trucks. Repeated use of large space in the magazines of widest circulation and greatest influence will feature the campaign.

PERIODICALS OF NATIONAL CIRCULATION are to be employed—among them *The Saturday Evening Post* and the leading business and trade publications.

IN LANGUAGE FREE from mystifying technical phraseology, the story of Sheldon's great achievement in axle construction will be unfolded before the layman. A straight appeal that puts it squarely up to his sense of values, performance and economy will show *the man you want to reach* why the truck he buys should have a Sheldon Worm Drive Axle.

FOR YEARS THE NAME SHELDON, among technically trained men, has been a symbol of supreme quality in axle design. And Sheldon copy will show clearly why Sheldon has won the unqualified endorsement of engineering opinion the world over.

See next two pages for reproduction of Saturday Evening Post advertisement for June 28th

Sheldon
FOR MOTOR

Automatic Adjustment

Expansion due to heat is compensated automatically in Sheldon Worm Gear Axles.

The Sheldon thrust bearing is a ball bearing—the only type of bearing that will take the thrust of the worm in both directions. The Sheldon front bearing is free to move as the worm expands, and thus adjusts itself to expansion and wear.

Sheldon Axles are Self-Adjusting

No external adjustment is necessary—therefore it is not provided.

In the Sheldon thrust bearing adjustment is automatic, which takes care of the expansion in the worm and prevents tight bearings and loss of power.

In addition to this feature, ball thrust bearings take all combinations of radial and thrust load directly through the center of the balls, so that wedging is impossible and friction is reduced to the minimum.



THIS is the first of a series of dominating advertisements which will appear in leading publications of national circulation.

Axle TRUCKS



Railroad Construction

Look at the axles of a locomotive or a freight car. The wheels are fixed to the axle shaft and the axle turns with the wheels.

Now look at an animal-drawn vehicle. The axles are stationary and the wheels turn.

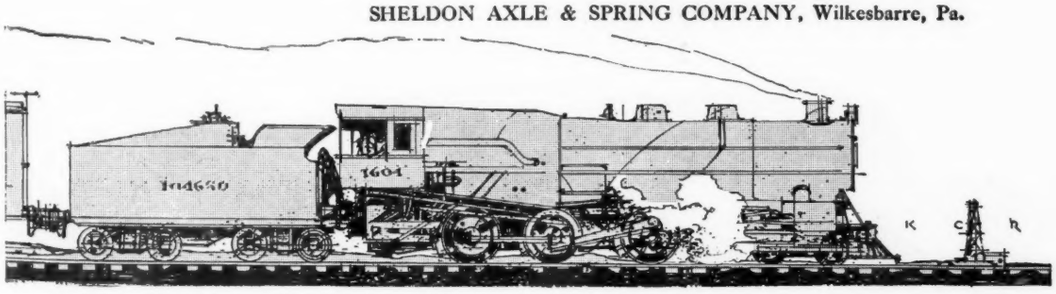
This type is satisfactory for the loads and speeds required, but railroad conditions demand the strongest possible axles for great weight and enormous side-strains. Hence the adoption of the fixed hub and wide spread of bearings.

This is the Sheldon Principle

It is the difference between axles for light, animal-drawn loads and Axles that Carry the Freight Tonnage of the World.

Send for catalogue explaining the Sheldon points of superiority

SHELDON AXLE & SPRING COMPANY, Wilkesbarre, Pa.



THE Saturday Evening Post and other magazines will carry the message of SHELDON quality to many millions of readers this year.

FROM THE FIRST, SHELDON ENGINEERS and builders have worked with one fixed purpose—to develop a worm drive axle that would give better and more economical service over a longer period of time.

Their efforts have never (as often happens) been circumscribed by any consideration of price.

For it seemed that any farsighted truck maker would be willing to pay somewhat more for his axles, and the user somewhat more for his truck, for the sake of a definite assurance of trustworthy performance.

Today the recognition accorded Sheldon in engineering circles is all the evidence needed that this policy has never been compromised.

SHELDON AXLE & SPRING CO.

Makers of Springs and Axles for Heavy Duty Service for More Than Fifty Years

WILKES-BARRE PENNA.

SLOCUM-AVRAM-SLOCUM MANAGEMENT



A Service That Eliminates Labor Difficulties

The problem of getting and keeping skilled help is but one of the many labor difficulties that beset both the old established as well as the new manufacturer.

The fact that the "manufacturing aid" service offered by the Slocum, Avram & Slocum Laboratories eliminates labor difficulties has very often been the dominant reason for manufacturers having all or part of their product manufactured in the plant shown below.

Other features of this service are outlined at the right.

Your communication will receive our prompt and efficient attention.

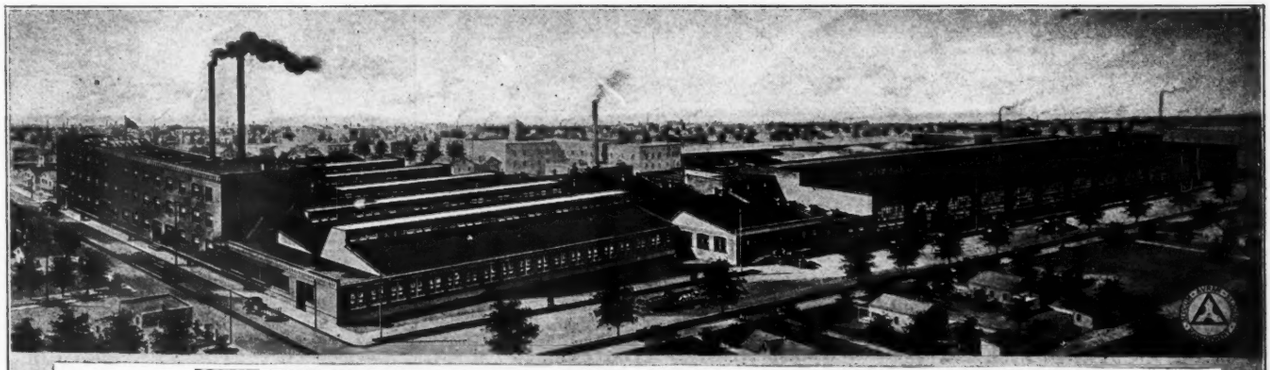
Did you ever figure out what labor turnover costs you in a year?

Real Manufacturing Aid

If yours is a problem of greater production—the development of a new part or the redesigning of an old one—new tools, jigs, fixtures or special machines—or if you are looking for a complete and efficient organization to take over the manufacture of certain parts send your problems to Slocum, Avram & Slocum Laboratories.

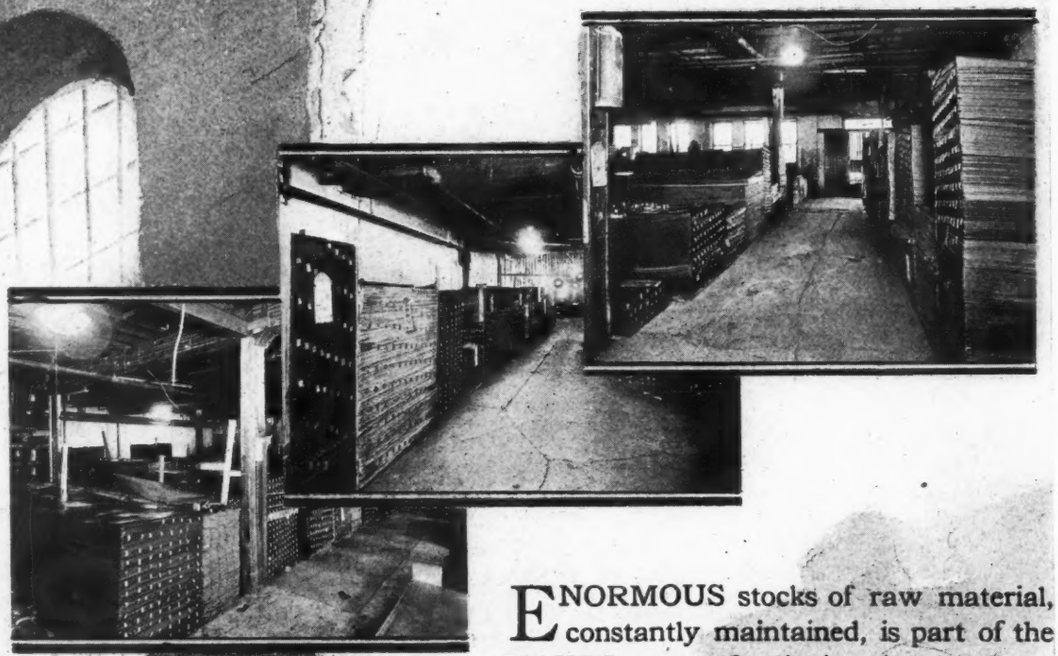
Slocum Avram & Slocum
Newark N.J. Laboratories Inc. U.S.A.

New York Office, Woolworth Building



MAKE THIS PLANT PART OR ALL OF YOUR MANUFACTURING ORGANIZATION

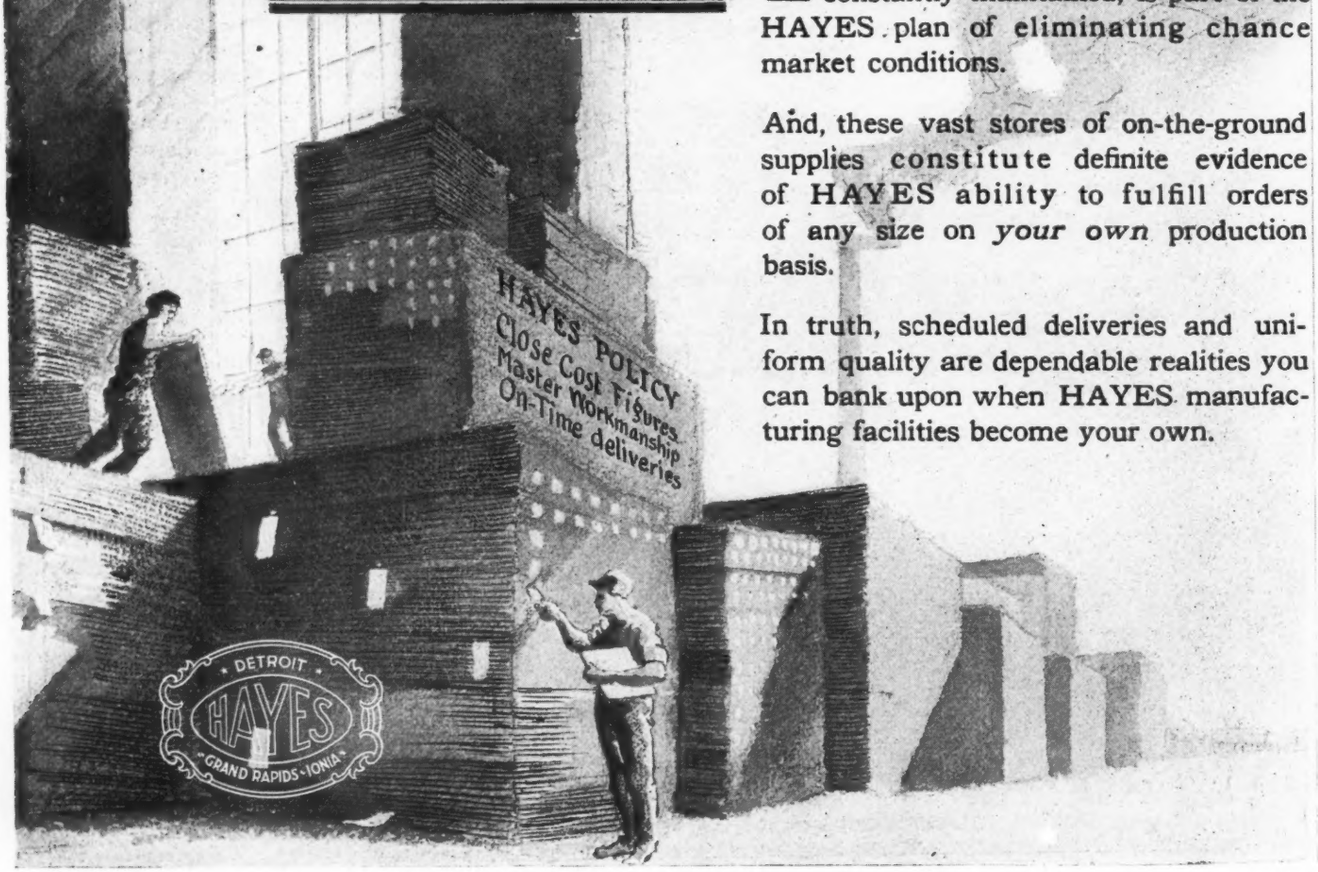
A MIGHTY RESERVE



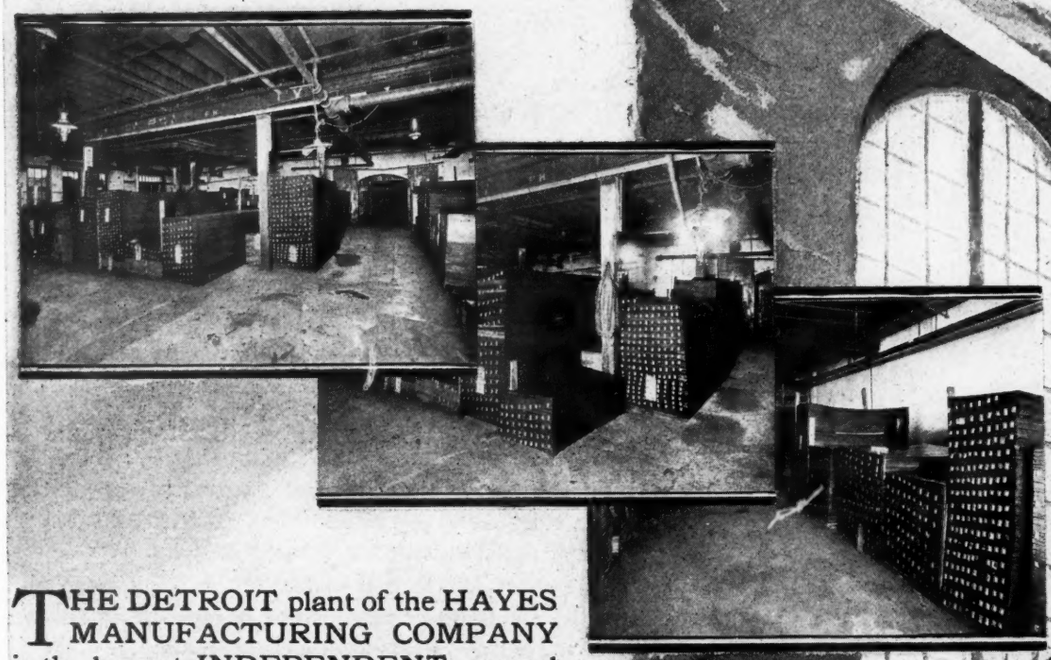
ENORMOUS stocks of raw material, constantly maintained, is part of the HAYES plan of eliminating chance market conditions.

And, these vast stores of on-the-ground supplies constitute definite evidence of HAYES ability to fulfill orders of any size on *your own* production basis.

In truth, scheduled deliveries and uniform quality are dependable realities you can bank upon when HAYES manufacturing facilities become your own.



IS YOUR PROTECTION



THE DETROIT plant of the HAYES MANUFACTURING COMPANY is the largest INDEPENDENT general automobile sheet metal stamping institution in the United States.

The GRAND RAPIDS factory of the HAYES IONIA COMPANY, being one of the most modern of its kind ever constructed, is specially equipped to produce CLOSED BODY WORK of all grades.

The IONIA plant of the HAYES IONIA COMPANY is devoted exclusively to OPEN BODY WORK of all classes and prepared to meet any production demand.

DETROIT HAYES GRAND RAPIDS-IONIA



Asbestos Rock



Sorting Fibre

Have your jobber check us up on this

THE uncertain supply of special grades of asbestos fibre gives the phrase "From Mine to Brake" a deeper significance for Jobber and Dealer than ordinarily.

The ability of Johns-Manville to continuously supply you with a uniformly high-grade brake-lining—Non-Burn—was never so clearly shown as today, when all markets are uncertain.

The fact that we do mine, spin and weave this lining from beginning to end, in a sense underwrites and makes valid our sales policy, which has for years assured the trade of not only a good lining, but the best lining, honestly merchandised and always obtainable.

There must never be any doubt as to the quality of this lining, or the spirit back of its sale. Ask your jobber about it.

P.S.—All indications from everywhere point to a straight-through-the-summer lining business. Your customers know Non-Burn because they know Johns-Manville. You can tell them that we stand back of it. They know what that means.

H. W. JOHNS-MANVILLE CO.
New York City
10 Factories—Branches in 63 Large Cities

Other Johns-Manville Automotive Equipment—**Clutch Facings, Industrial Brake Blocks, Speedometers, Odometers, Recorders, Speedometers with Instrument Board for Ford Cars, Fire Extinguishers.**

JOHNS-MANVILLE SERVICE COVERS THE CONTINENT

Through—

Asbestos

and its allied products

JOHNS-MANVILLE Serves in Conservation

Heat Insulations, High Temperature Cements, Asbestos Roofings, Packings, Brake Linings, Fire Prevention Products

JOHNS-MANVILLE
AUTOMOTIVE EQUIPMENT

A PLANT WITHIN A PLANT

THE SPECIAL PRODUCTION DEPARTMENT of The Stanley Works has the floor space of an ordinary factory completely equipped, devoted to stamping, forming and drawing steel. Modern in every way with facilities for turning out quantity as well as quality products.

We Are Estimating From Samp es and B!ue Prints of All Sorts.

Your correspondence is solicited.

The Stanley Works

NEW BRITAIN, CONN.

NEW YORK
100 Lafayette St

CHICAGO
73 E. Lake St.



"Specialists in Wrought Steel Specialties"

Auto-Lite

Starting, Lighting & Ignition



The Big Little Generator

ONLY 4½ inches in diameter, this Auto-Lite Round Type Generator is one of the smallest and lightest made. Yet it has a marvelously large output capacity.

Frame and four poles are of rolled steel. It is self regulating through the Third Brush System, which means no sticking, corrosion or variation in its adjustments.

It begins to charge into the battery at the low speeds used in city driving and automatically decreases the charge at higher speeds, thus preventing depreciation of the battery.

A generator that is wonderfully compact and trustworthy.

Electric Auto-Lite Corporation

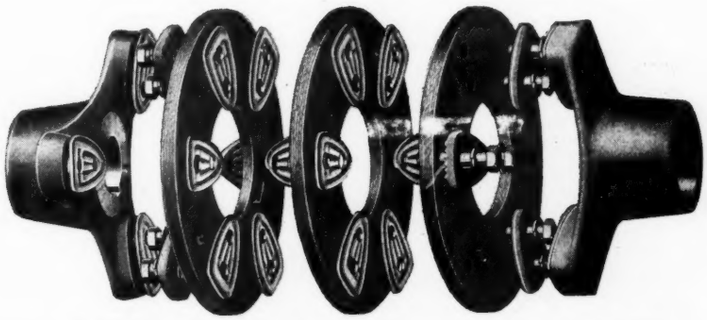
Head Office and Factory, Toledo, Ohio

Detroit Sales Office, 1507 Kresge Bldg.

FLEXITE

Trade Mark Registered

HEAVY DUTY UNIVERSAL JOINTS



PARTS OF A FLEXITE HEAVY DUTY UNIVERSAL JOINT



THE FLEXITE DISC

The Disc Carries the Load

Flexite discs are correct mechanically, because both in design and production they follow sound engineering practice.

Each careful step in their manufacture has an ultimate purpose in the proper functioning of the finished product.

This is why Flexite Discs secure strength without stiffness and flexibility without weakness.

Each Flexite Disc acts as a series of flexible links in transmitting the power.

The load on the disc is evenly distributed over its entire width.

The Flexite Discs carry the load without transmitting the shocks of sudden starting and stopping.

Write for Bulletin

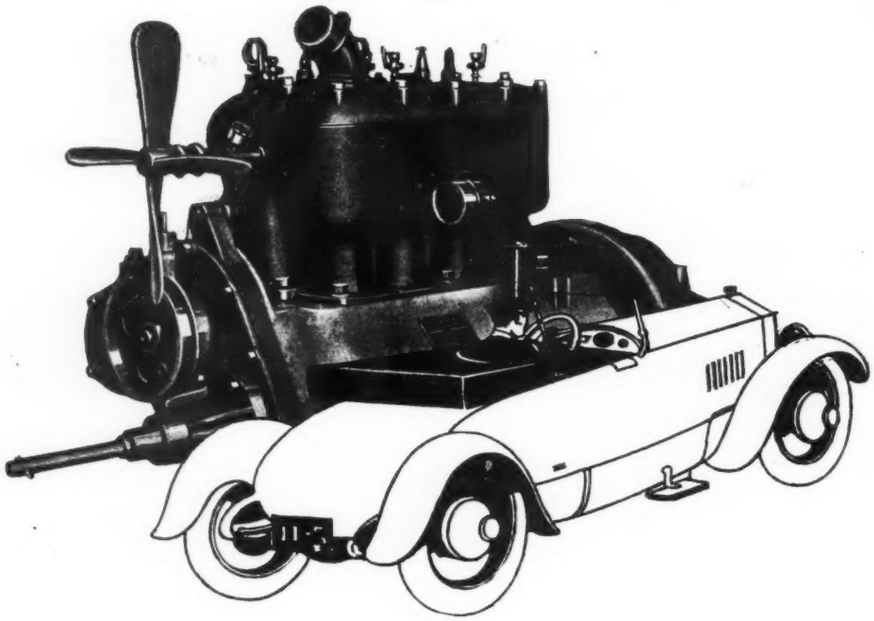
F. R. BLAIR & CO. INC.
50 CHURCH STREET
NEW YORK

Makers of FLEXITE Standard Magneto and Generator Couplings

LYCOMING FOUNDRY & MACHINE CO. WILLIAMSPORT PENNA.

LYCOMING

MOTORS



You Sell Your Car on a Promise of Performance

ON its ability to live up to that promise, depends its reputation with the motorists and dealers to whom you must look for future sales.

The essential factor in the performance of any car is its engine. Before anything else you must insure its power producing qualities and its capacity to stand up under service.

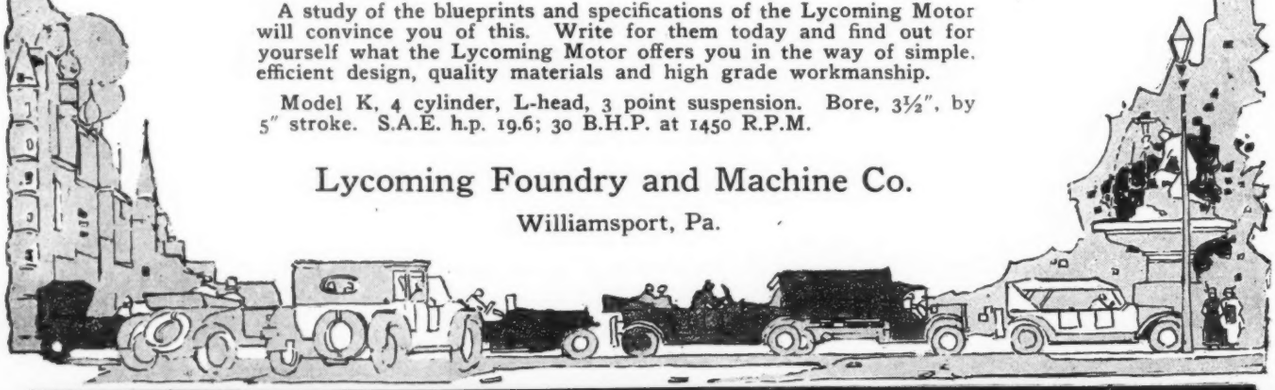
If your car is equipped with a Lycoming Motor you are certain of these fundamentals. You know that its reputation for power and reliability is safe. You know you have laid the foundation for its lasting popularity.

A study of the blueprints and specifications of the Lycoming Motor will convince you of this. Write for them today and find out for yourself what the Lycoming Motor offers you in the way of simple, efficient design, quality materials and high grade workmanship.

Model K, 4 cylinder, L-head, 3 point suspension. Bore, 3½", by 5" stroke. S.A.E. h.p. 19.6; 30 B.H.P. at 1450 R.P.M.

Lycoming Foundry and Machine Co.

Williamsport, Pa.



THE MOTOR FOR THE DISCRIMINATING CAR BUILDER

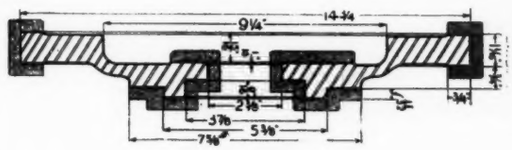
BULLARD

Released 60 Men and a Roomful of Machines

THOUSAND after thousand of the flywheel shown here have been produced on the BULLARD MULT-AU-MATIC in an average time of 2 min. and 15 sec. each. Best previous time, in machines selected and tooled to obtain highest efficiency, 15 min. each. And the work of the Mult-Au-Matic was of a higher and more uniform quality. It is an evidence of the dependableness of the Mult-Au-Matic and its capacity for maintaining production at a high rate.

On another job the Mult-Au-Matic is producing in one hour 80 pieces. Best former record 20 pieces in one hour.

Still another Mult-Au-Matic job shows an increase of ten to one over former methods.



Motor Fly Wheel

Cast Iron

Total Time, Two Chuckings,	2 Min. 15 Sec.
First Chucking.....	1 Min. 22 Sec.
Second Chucking.....	0 Min. 53 Sec.

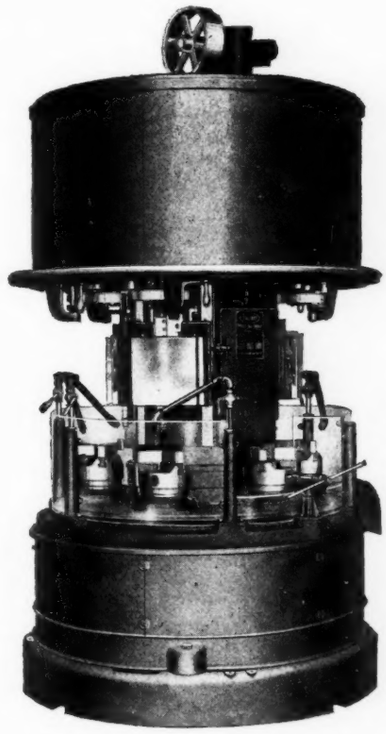
BULLARD

MULT-AU-MATIC

is six machines in one, and requires but one operator. It is a saver of money, men and machines. Less investment is required, less floor space, less tool expense, lower maintenance charges, and but one man is required to obtain its maximum production.

The Mult-Au-Matic includes in its scope all classes of castings, forgings and bar stock cut to lengths, coming within its capacity and requiring boring, turning, facing, etc., operations either singly or in combination.

If you have work for this machine, write us for an estimate. Let us **show** you that your cost can be reduced, time saved, and overhead cut down.



Deliveries Are Good

THE BULLARD MACHINE TOOL COMPANY

Bridgeport **Conn., U. S. A.**

SELECTION of THE RIGHT LUBRICANT FOR THE NC-4 FLEET

IT is not our desire to snatch one mite of the homage and credit due the intrepid and fearless crew who took their lives in their hands and sailed out into the unknown—but efficient, perfect and constant lubrication was the greatest factor in the ultimate success of this adventurous trip. Hence, the Navy left nothing to chance. Grilling, practical tests, scientific investigation, exhaustive research, were all combined against the possibility of disastrous engine troubles resulting from poor lubrication.

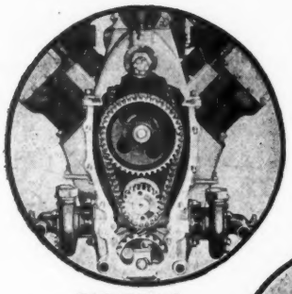
The choice of GULF LIBERTY AERO OIL, therefore, was made with a positive knowledge that it would fulfill every requirement, and the success of the NC-4 has proven the wisdom of the choice.

Supplied by

GULF REFINING COMPANY

Manufacturers of

SUPREME AUTO OIL and THAT GOOD GULF GASOLINE



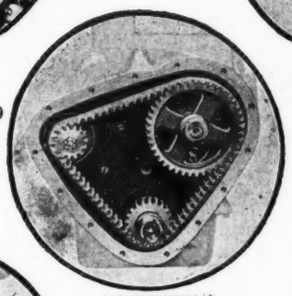
CADILLAC
4-cyl.-1912-13-14
8-cyl.-1915-16-17-18-19



PACKARD "12"
1916-17-18-19



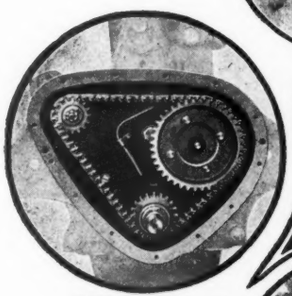
WINTON "6"
1916-17-18-19



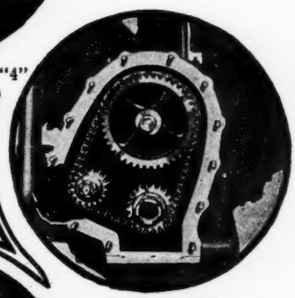
HUPMOBILE
Model N-1915-16-17
Model R-1918-19



STEARNS-KNIGHT "4"
1914-15-16-17-18-19



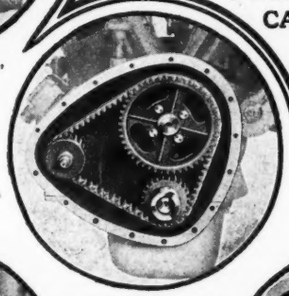
CHALMERS "6"
1917-18-19



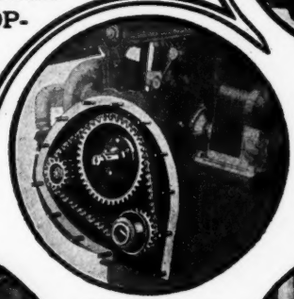
KING "8"
1917-18-19

Morse Front End Drives

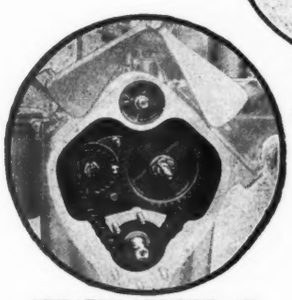
THE ACCESSORY THAT HAS KEPT PACE WITH MOTOR CAR DEVELOPMENTS



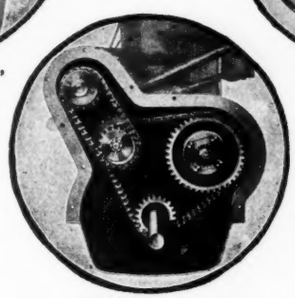
HAYNES "12"
1917-18-19



TEMPLAR "4"
1918-19



STEARNS-KNIGHT "8"
1916-17-18-19



SCRIPPS 4 & 6
1918-19



NATIONAL "12"
1916-17-18-19

THESE SPACES ARE SOLD. WHO TO?

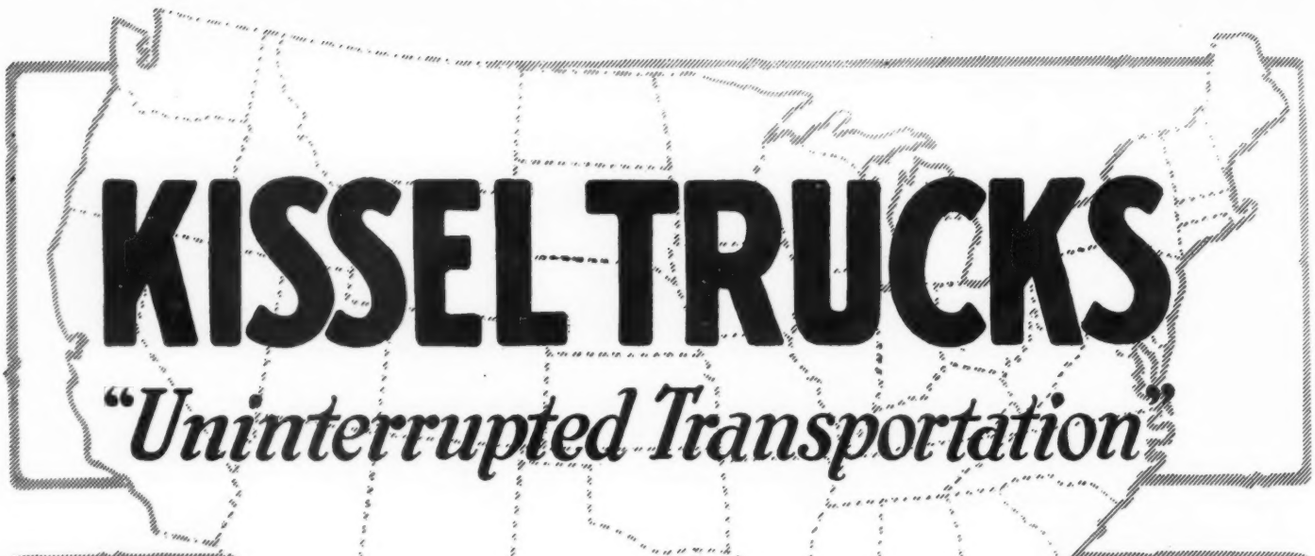


Five new customers have been added so far this year. As announcements are made of their new models, new faces will appear in these circles. Watch for the new faces and more circles. Many more to follow this year.

MORSE CHAIN CO., Gen'l Office and Works: **Ithaca, N. Y.**

Largest Manufacturers of Silent Chains in the World

Detroit Sales Office and Display Rooms, 1003 Woodward Ave.



KISSEL TRUCKS

"Uninterrupted Transportation"

Solving the Nations Readjustment Problems

THERE is no question as to the productive ability of America—that has been proven.

The real problem that confronts the American business man is to keep up an endless flow of supplies, materials, goods, etc., to port of shipment.

In other words, there must not be the slightest uncertainty of delivery on schedule time, of necessary living supplies and necessities which not only Europe is looking to us to provide, but on which our Nation's commercial and social life depends.

No truck purchaser can afford to purchase motor trucks backed up by doubtful manufacturing facilities. He cannot afford to trust his transportation problems to trucks that have not demonstrated their mechanical superiority. It is plain, good business judgment to place your choice of trucks in trucks that—value for value—quality for quality—measure second to none; trucks that are backed up by intensive as well as extensive manufacturing and service facilities—trucks that are the result of studying the peculiarities that characterize the delivery and hauling problems of your own business.

The Kissel Truck owners of today made their final choice because investigations proved that they were built on correct mechanical principles, insuring satisfactory and continuous service and performance.

Take the nationally known corporations and industries that employ fleets of Kissel Trucks. Their purchasing experts made no half-hearted investigations; they knew that the rise or fall of their business institutions depended on the successful solution of their transportation problems. Consequently their investigations were sweeping in every detail—they were investigations that only transportation experts know how to make.

Their experience had taught them that a truck in order to endure and survive the grill of exceptional demands and conditions must be built unusually strong. They found that this was the dominating thought in every step of Kissel truck construction, from the selection of material, the testing of the steel and other components, the liberal dimensions and highest grade construction of the frame, axles, springs, brakes, etc.—up to the famous Kissel-built power-plant specially designed for motor truck requirements.

And when it came to a final checking up, the result which caused their decision was that a Kissel Truck chassis was a scientific achievement, strongly built and perfectly balanced.

The unusual transportation demands now being made on every manufacturer and industry, necessitates every truck purchaser taking the chance out of truck buying—the uncertainty out of truck performance—the risk out of truck investing. The great importance of your transportation equipment keeping pace with your production facilities is too vital to trust to any truck but the one that fits your problems.

Kissel long ago found that no two transportation problems are alike. Each requires individual study, intelligent analysis. Your nearest Kissel dealer is prepared to show you how the perfection to which Kissel Trucks have been brought is your protection—protection in your investment—in your haulage delivery and shipping department—in your present and future volume of business.

Every Kissel Truck represents eleven years of truck experience and experiments—investigations and tests—with never a failure—and the first Kissel Truck still in active service.

This calls for a truck with unlimited hill-climbing power, speed ability on good roads, wear-durability on bad roads, emergency capacity, rapidity of loading and unloading, ease of operating and driving in traffic zones at low upkeep. These truck requisites that are built into Kissel Trucks are absolutely necessary to solve the unusual readjustment transportation problems which every manufacturer and industry has been called upon to face.

Purchase motor trucks as you purchase any other part of your equipment. You will find it's a good business practice from every standpoint.

Kissel Truck dealers are in every principal city. Literature on request.

Kissel Motor Car Co.
Hartford, Wis., U.S.A.



To Tractor Manufacturers

Reconstruction has given birth to countless tractor problems.

Sources of raw materials are uncertain — trade channels are blocked — local conditions in your new territories unknown —problems of manufacturing and equipment are many.

Appreciating the need of the tractor industry for an absolutely reliable source of supply for bolts and nuts, we are now in a position to give special attention to the tractor manufacturer.

A Tractor Is Often Operated Far From the "Base of Supplies"

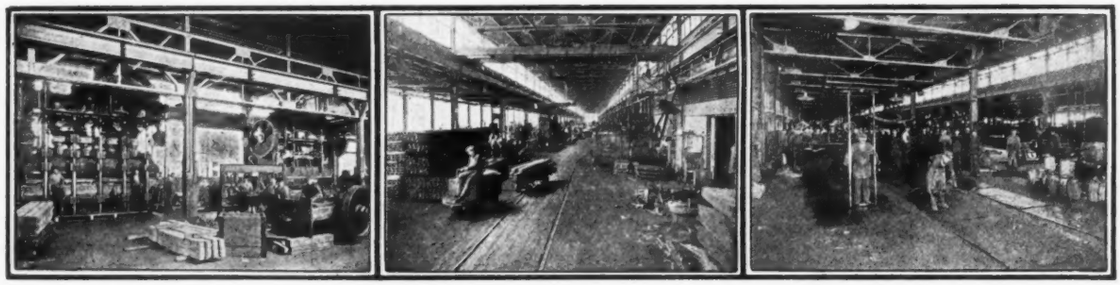
UNLIKE the driver of the touring car or limousine the operator of a tractor cannot run his machine around the corner to a garage. Repairs must often be made on the field and the successful tractor must be as near "repair proof" as it is possible to make it.

Bolts, nuts and rivets form a super-important part of tractor assembly if a "repair proof" condition is to be attained. Protect the tractors you build from bolt, nut and rivet breaking and stripping by using the brand that has won nation wide renown.

RUSSELL, BURDSALL & WARD BOLT & NUT COMPANY

PEMBERWICK, CONN PORT CHESTER, NEW YORK ROCK FALLS, ILLINOIS

Makers of Bolts, Nuts and Rivets Since 1845



For Every Reason the Frame Specifications Should Read

PARISH & BINGHAM

It takes a mighty big plant and a highly perfected organization to turn out frames designed and built to conform with the design of each particular car, truck or tractor they are to equip.

And to do this on a large quantity basis—

And to do it promptly.

Parrish and Bingham has such a plant and organization.

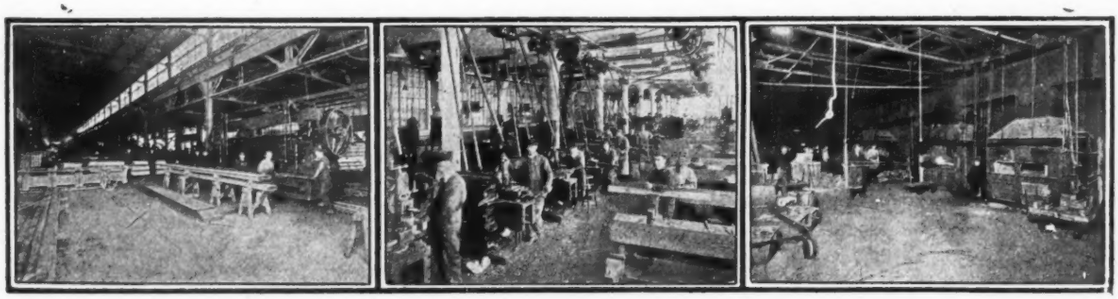
Here frames are turned out "made to order" in tremendous quantities, at great speed and at low cost.

Special machinery, tools and systems for putting work through are all combined to make this special design, quantity and quality production possible.

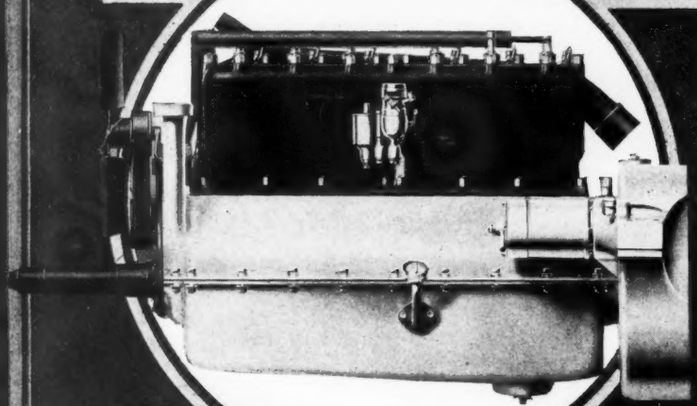
The Engineering Department is highly specialized in frame designing. Its members are past masters in the art of achieving the combination of strength, endurance and weight economy—all factors that make for high efficiency in cars, trucks and tractors.

Send us weight, horsepower, wheelbase and type of car, truck, tractor or trailer you are building. We will then show you the Parish & Bingham better way of frame building.

THE PARISH & BINGHAM COMPANY
CLEVELAND, OHIO

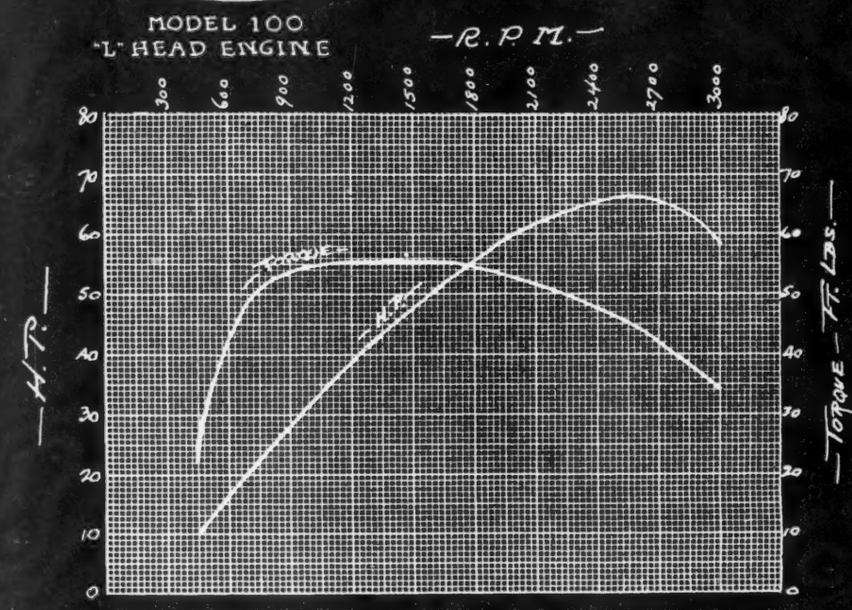


TREGO



PASSENGER CAR ENGINES

NOW READY



Performance, Characteristics, Curves of Standard Trego Model 100, "L" Head, 3½ x 5, Six-Cylinder Engine on Sprague Electric Dynamometer

Trego engines are shipped with certified individual dynamometer test records, thus eliminating the customary practice of test and adjustment by the automobile manufacturer.

TREGO MOTORS CORPORATION

Builders of the United States Liberty Engine

NEW HAVEN CONNECTICUT, U. S. A.

WANTED—A MAN

THE President of a well-known nationally advertised motor truck concern desires to be relieved of some of the important details of administering the affairs of the organization. He requires the services of

A General Manager

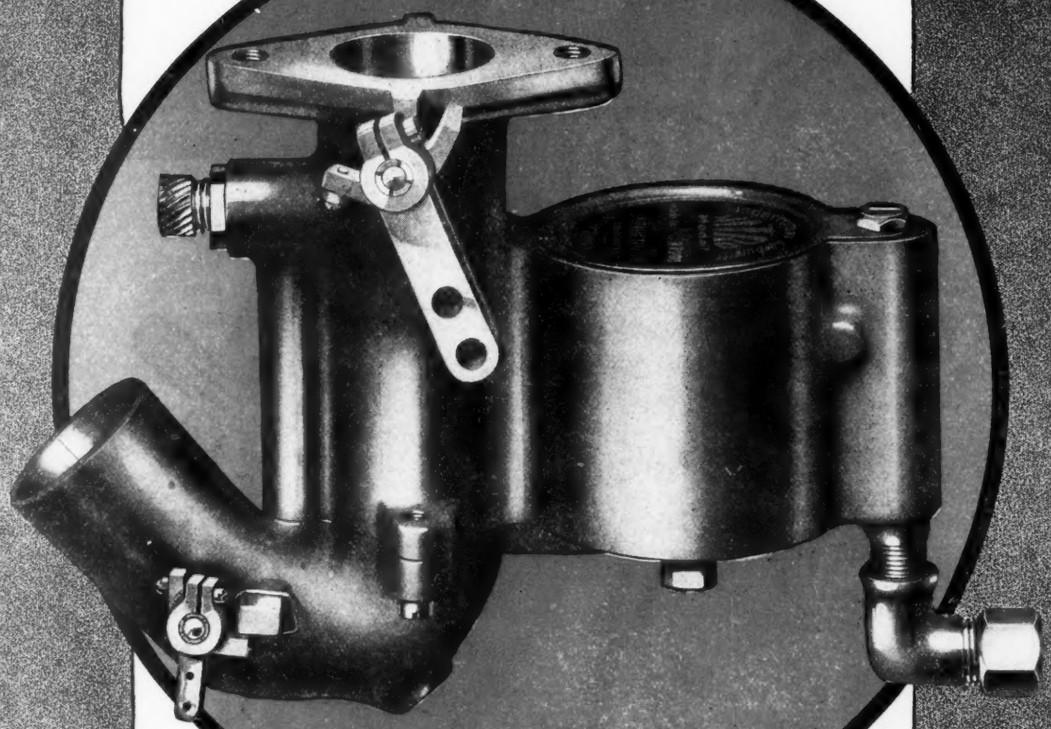
A man with a record of success in the truck field—a man who thoroughly understands the merchandising of a high grade truck—who knows the retail selling angle—the distribution problems—the manufacturers' problem and can make good. Of course, he must have energy, initiative and progressiveness enough to shoulder responsibility and discharge it with promptness and efficiency. To such a man an unusual opportunity is offered and a salary commensurate with the size of the job will be forthcoming.

Applicants are requested to write in complete detail in their first letter, the contents of which will be held in strict confidence.

Address—The President—personal, Box 411

AUTOMOTIVE INDUSTRIES

Look at It



NITRO

SUNDERMAN

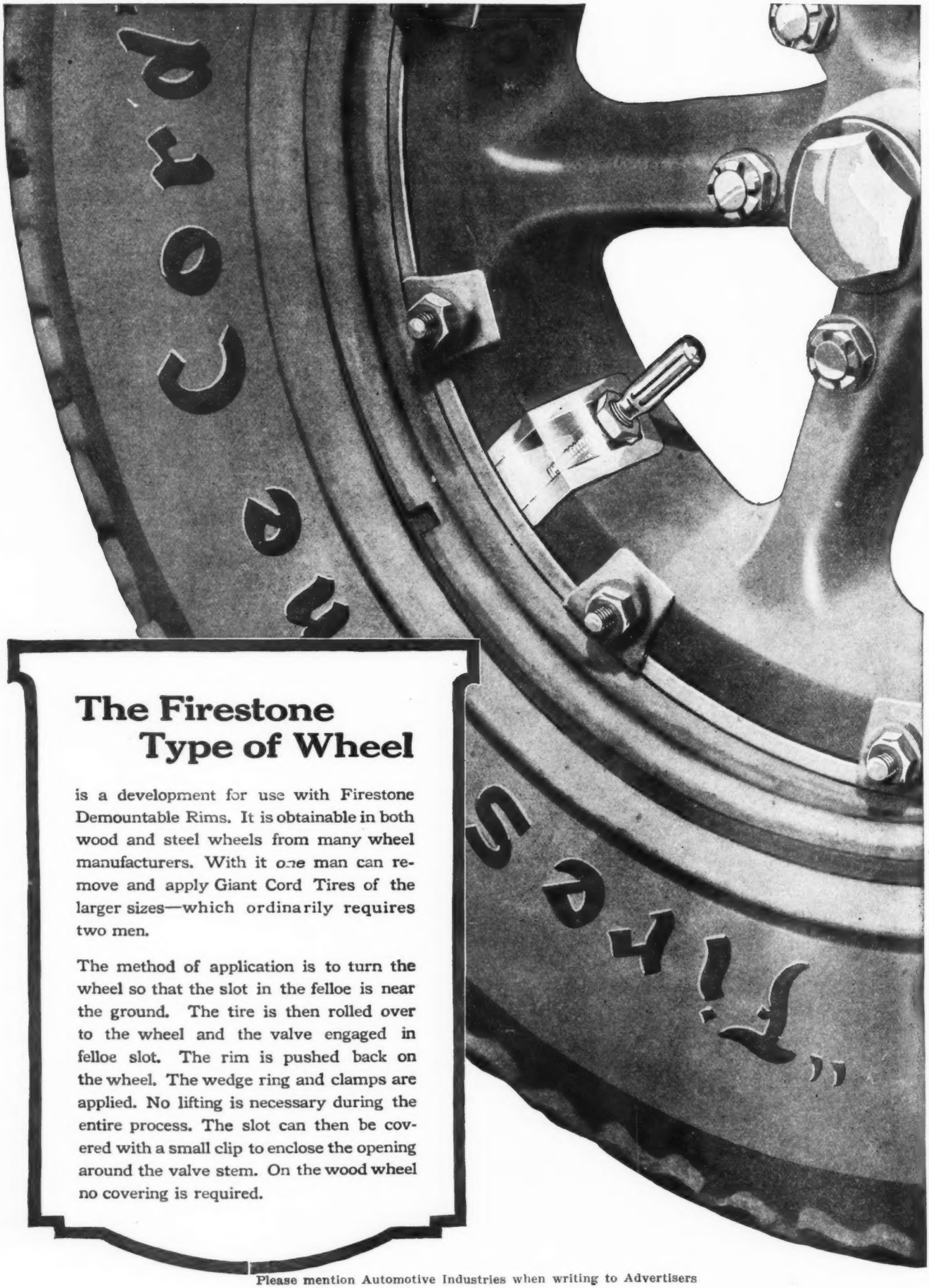
CARBURETOR

It's so Simple

Simplicity is a necessary feature of a carburetor. The designers of the new NITRO carburetor appreciated this fact, and have succeeded in making the NITRO so simple, so fully automatic in operation, that it is obviously easy to adjust and to understand—it has but ONE adjustment and that one easy to reach. Another reason why the NITRO is the logical carburetor equipment for YOUR new chassis.

Sunderman Corporation, Newburgh, N. Y.

© 1919. Rex W. Wadman, Inc.



The Firestone Type of Wheel

is a development for use with Firestone Demountable Rims. It is obtainable in both wood and steel wheels from many wheel manufacturers. With it one man can remove and apply Giant Cord Tires of the larger sizes—which ordinarily requires two men.

The method of application is to turn the wheel so that the slot in the felloe is near the ground. The tire is then rolled over to the wheel and the valve engaged in felloe slot. The rim is pushed back on the wheel. The wedge ring and clamps are applied. No lifting is necessary during the entire process. The slot can then be covered with a small clip to enclose the opening around the valve stem. On the wood wheel no covering is required.



FIRESTONE has given to the Motor Truck Industry a new wheel design which puts added efficiency into the use of Giant Pneumatic Tires.

When the demand for speed in trucking centered the interest on the perfection of Giant Pneumatics, Firestone produced the rim which aided so materially the practical use of Giant Pneumatic Tires.

To further aid the industry, Firestone now offers a new thought in wheel design which makes more practicable the removal and application of Giant Pneumatics.

With this combination, it is possible for *one* man to remove the largest tire and apply an *inflated* spare tire in five minutes. It is not necessary that the man have experience to accomplish this result.

Firestone does not build wheels. But the Firestone type of wheel is obtainable from many wheel manufacturers, who have incorporated the Firestone idea in their standard wheels, thus permitting them to carry the Firestone type C Rim.

There are no royalties or restrictions involved in the use of the idea. It is the Firestone hope that the industry may profit by the use of this wheel design. Its success to date indicates that it has great value both to truck operators and drivers.

The Firestone Steel Products Co.

FIRESTONE PARK
AKRON, OHIO

Sell only Genuine Stewart parts for Stewart CUSTOM BILT NECESSITIES

"Look for the Red Tag"

Advertisement Number Four of a Series

CAUTION

This tag is attached to all genuine Stewart Repair Parts.

LOOK FOR IT!

If you don't find this tag, you are getting imitation substitute parts. Refuse to accept them.

The use of imitation parts on any Stewart Product, at our option, invalidates the Stewart guarantee.

For your own protection demand genuine Stewart Parts.

STEWART-WARNER SPEEDOMETER CORPORATION

A Red Tag like this is attached to *all* and *only* genuine Stewart Parts. It is for your protection as well as your customers. Demand it on the parts you buy.



You Would Never Sell Another Imitation

—if you were in one of our Service Stations and heard the remarks when a car owner finds he has had palmed off on him an imitation part for a Stewart Product.

His remarks are not very complimentary toward the dealer that sold it to him, we can assure you. Can ***you*** afford to let this dealer ever be ***you?***

Therefore, sell only GENUINE *Stewart* Replacement parts

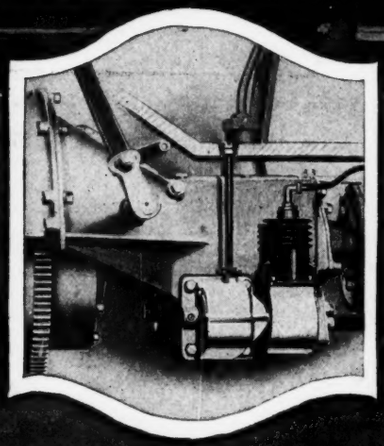
We Sell Only
AUTHORIZED
Stewart
REPAIR PARTS
LOOK FOR THIS RED TAG
ATTACHED TO ALL GENUINE *Stewart* PARTS

Stewart-Warner Speedometer Corp.
Chicago, U.S.A.

"Hang up this Sign"

This sign is your public certification that you do not deal in imitations. Will be sent free for the asking. Is made of steel, beautifully lithographed in three colors and embossed. Size, 14x20 inches. All ready to hang. Very attractive. *Order yours today!*





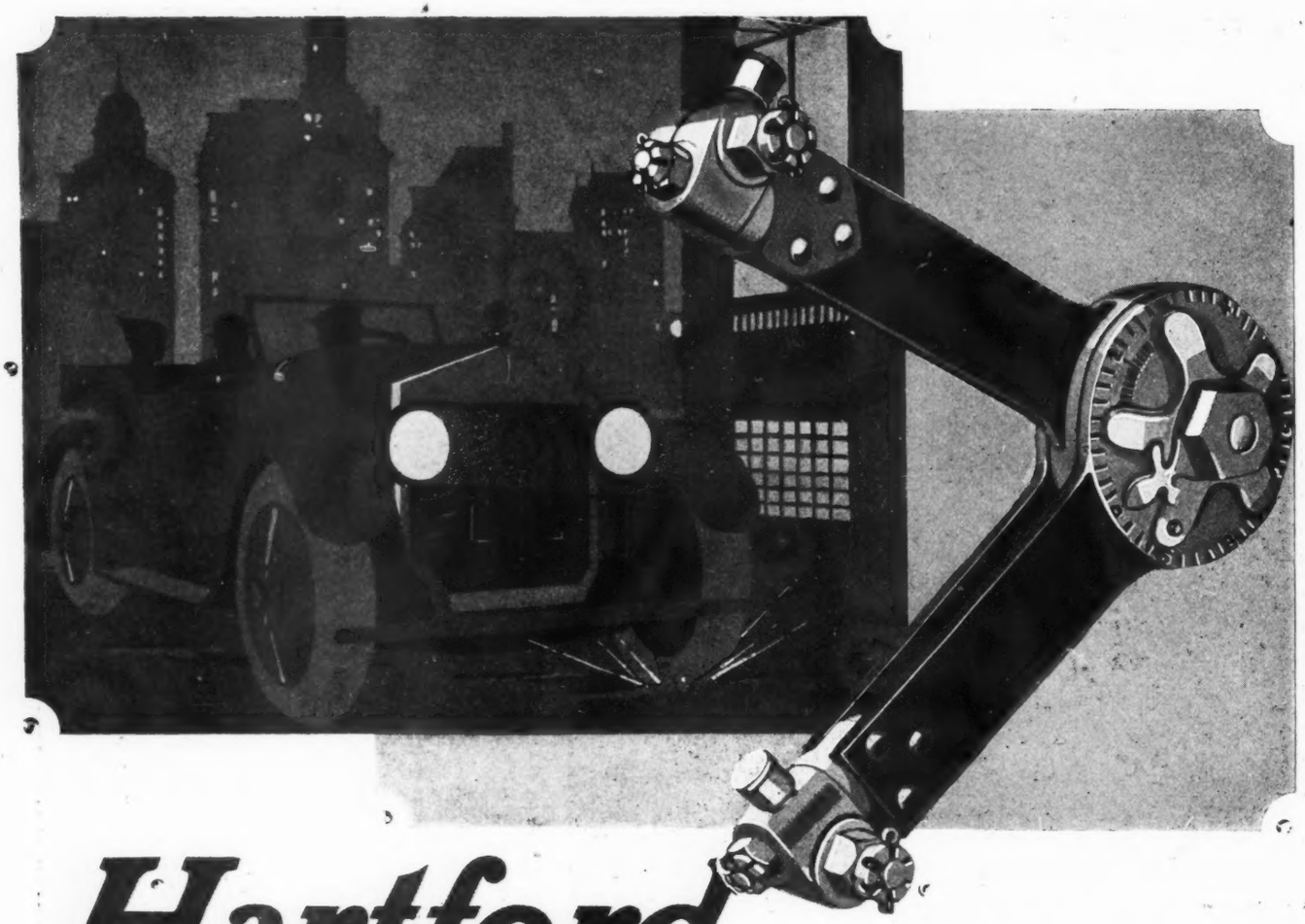
"Both are Passenger Cars"

THE light sport car and the 5th Avenue Bus are both passenger cars—but what a difference! Where the ordinary tire carrying an air pressure of 60 to 90 pounds will do for the passenger car, the heavy bus when it uses pneumatics must adopt the masterpiece of the tire maker's craft, the giant pneumatic with its pressure of from 150 to 175 pounds.

And yet the terrific pressure requirements of this big "passenger car's" tires can be met by the same make of air compressor as has served so well for its little brother—the Kellogg Engine Driven Tire Pump.

KELLOGG MFG. COMPANY
Rochester N. Y.

KELLOGG
Engine Driven
Tire Pump



Hartford
SHOCK ABSORBER

THE TEST

NIGHT driving is a sure test of dependability. Irregularities in road surfaces are hard to gauge. The sledge-hammer blows dealt a car by these bumps hasten it to the junk pile, and are a source of continual discomfort to occupants.

Recommend that your customers protect their cars and themselves by equipping with Hartford Shock Absorbers. Night driving will be made a pleasure, for the Hartford will take a car over the ordinary bumps smoothly and evenly. You will win happy, satisfied customers, who will bring you new friends.

And then figure the net profit to yourself. If you handle this line in addition to your agency, you get a generous profit on the sales of the Hartford plus your original profit on the car you sell.

The Hartford is part of the factory equipment of most of America's finest cars. This, in itself, is proof positive that it is the leader in its field. It has been the leader for fifteen years.

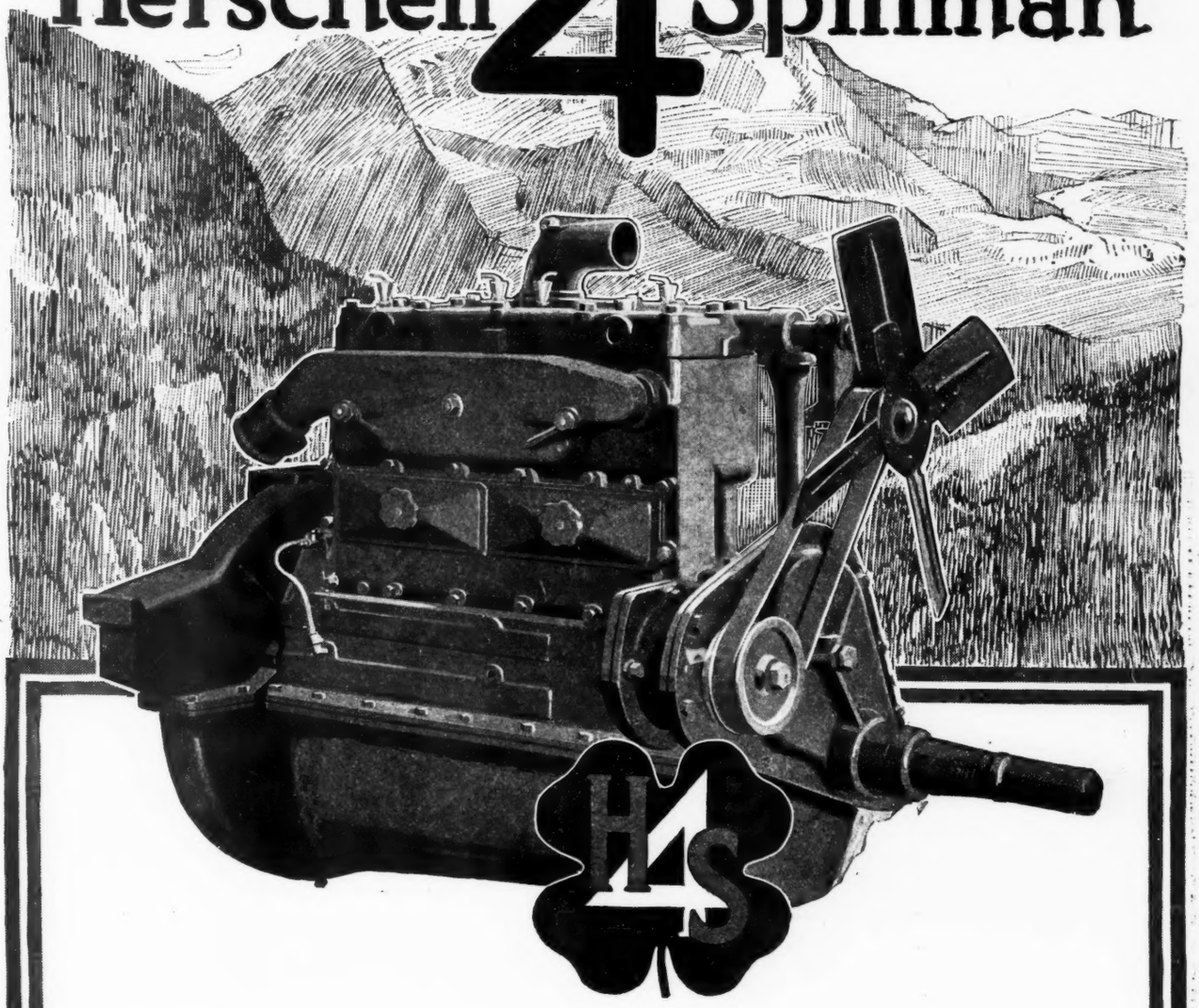
Write us for our dealer proposition and details regarding our national advertising campaign and attractive literature and dealer helps.

The Hartford line includes two other big sellers that it will pay you to stock—**Hartford Spring Bumper** and **Hartford Auto Jack.**

EDWARD V. HARTFORD, Inc. **144 Morgan Street, Jersey City, N. J.**

Factory Branches—BOSTON: 319-325 Columbus Ave. CHICAGO: 1716 Michigan Ave.

The Herschell 4 Spillman



"The Pick of the Field"

The Peak of Power

The Herschell-Spillman "4" tops its class in power—develops driving force enough to propel your passenger car or light truck into fame and demand on a performance basis.

The Herschell-Spillman "4" is a 100% Engine. It has the ability to perform and the courage to endure on this basis.

Write for Facts

THE HERSCHELL-SPILLMAN MOTOR CO.

North Tonawanda **New York, U. S. A.**



Jack your car on ball bearings

A FEW easy turns on the long handle and your car is raised. To lower it, merely reverse the turns and pull the jack out by the handle.

You perform every operation without once getting under the car.

The diamond point hardened steel top with *bull-dog* grip bites the axle and holds it firm. There is no danger of slipping. You can avoid having the tire rim fall on a deflated tire.

Kimball Jacks sell fast because every time you use this jack you give a demonstration. Motorists everywhere want the Kimball because it is reliable and easy to use. Stock it and sell more jacks.

PRICES

Size	Minimum Height	Extended Height	Price
No. 1	9 in.	15 in.	$7.00
No. 3	11 in.	18 in.	7.00
No. 4	12 in.	20 in.	7.00

Kimball Special Truck Jack that easily raises any style truck sells for $15.00.

Every operation of raising and lowering ***without even*** *stooping. You can avoid dirt* ***and*** *grease, eliminate all chance of ruining clothing* ***and*** *injuring hands.*

KIMBALL AUTO BALL BEARING JACK

SALES DEPARTMENT

Edward A. Cassidy Company, Inc.

Madison Ave. at 40th St., New York

Manufacturers, F. W. Mann Company, Milford, Mass.



Ralph K. Mulford, Jr., in Daddy's Car day of race

Same tires after the race

AGAIN BRAENDER TIRES WIN!

On Ralph Mulford's Frontenac Car
at Sheepshead Speedway, June 14, 1919

First in Thirty Mile Race. Time, 16 min. 20 3/5 sec.
Beats old record by 11 1/5 sec.
First in Ten Mile Special. Time, 5 min. 24 1/5 sec.
Second in First Ten Mile Race (1/5 second behind the winner).
Time, 5 min. 20 2/5 sec.
Beats old record by 3 2/5 sec.

Leading the first 9 laps in the 50 mile Race. Discontinued on account of broken piston.

WORLD'S RECORDS SMASHED

for 10 and 30 mile events.
Average speed 110 and 112 Miles per hour.

BRAENDER TIRES

Unequalled for Speed, Endurance and Economy.

Not a single Braender Tire was changed at Indianapolis Speedway May 30, 1913, when the four Braenders on Mulford's Mercedes carried the heaviest car in the race the entire 500 miles.

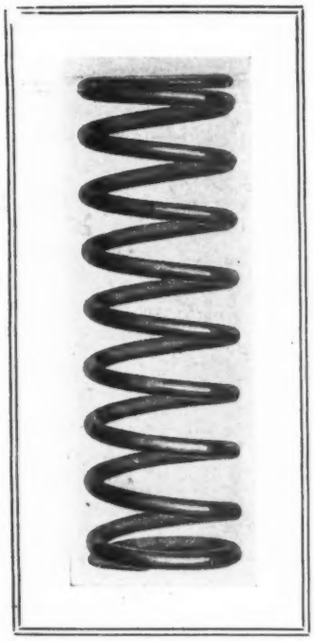
BRAENDER RUBBER & TIRE COMPANY, Factory, Rutherford, N. J.

BRANCHES:

Chicago
64-72 E. 14th St.

New York
32 Broadway

Philadelphia
1352 W. Girard Ave.



IT is Not Worth While to Reduce The Reliability of Your Engine to Save a Few Cents on a Valve Spring

By perfecting the details of its construction you are protecting the reputation of your car. The performance of each part contributes its share to the satisfaction motorists will get out of the car as a whole.

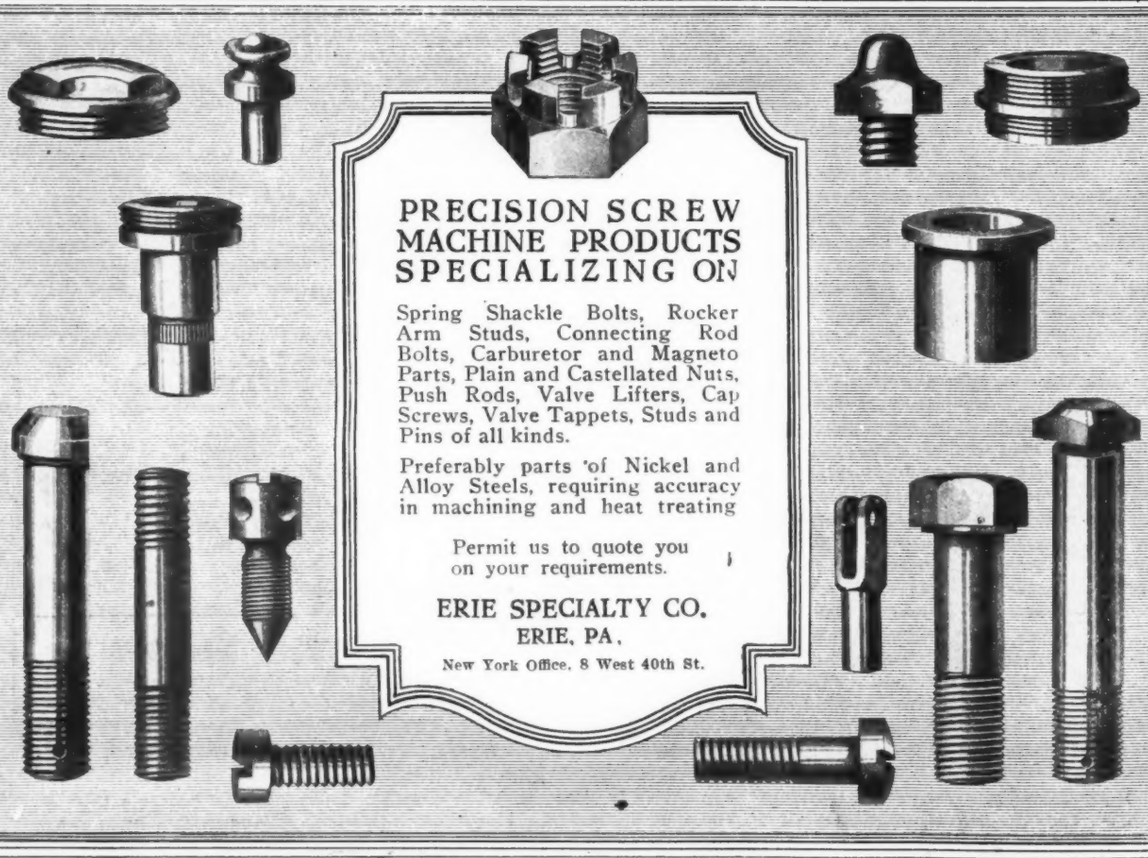
When you want valve springs that insure efficient valve action and give security against breakage, you should take advantage of the facilities of The Wallace Barnes Co.

The Wallace Barnes Co. are spring specialists. They can furnish you anything you require in valve springs, clutch springs, or any other spring or spring steel part used in automobile or accessory construction. They can furnish the quantities you need, in unvarying quality and absolutely up to specifications.

Write for estimates. Submit your problems. Ask for Booklet 7 X.

THE WALLACE BARNES COMPANY
Coil Springs, Special Springs, Spring Steel Parts
418 South Street, Bristol, Conn.
New York: 50 E. 42d St. Detroit: 618 Book Bldg.

SPRINGS, WIRE & STEEL — ESTABLISHED — BARNES-MADE PRODUCTS — 1857 — SCREW MACHINE PRODUCTS



PRECISION SCREW MACHINE PRODUCTS SPECIALIZING ON

Spring Shackle Bolts, Rocker Arm Studs, Connecting Rod Bolts, Carburetor and Magneto Parts, Plain and Castellated Nuts, Push Rods, Valve Lifters, Cap Screws, Valve Tappets, Studs and Pins of all kinds.

Preferably parts of Nickel and Alloy Steels, requiring accuracy in machining and heat treating

Permit us to quote you on your requirements.

ERIE SPECIALTY CO.
ERIE, PA.
New York Office, 8 West 40th St.

New York Sun, June 8, 1919

NASH QUADS WIN ARMY SHOW HONORS

Get First and Third Prizes in Sayn, Germany.

From "across the Rhine" comes testimony by the American Army of Occupation of further distinction accorded the famous Nash Quad. Word that two Quads have been awarded first and third prizes respectively in the Divisional Motor Show of the Thirty-second Division has just been received by the Nash Motors Company.

Requirements under which the prizes were awarded were based upon military standards and were very rigid. That the two Quads secured top honors is another tribute to the dependability, durability and performance of the Quad.

Information concerning the outcome of the divisional show came in the form of a letter from Capt. Edward Dayton. The show was held at Sayn, Germany, near Coblenz, and was looked upon by army officers as one of the most important events to be held during the period of occupation.

The winning Quad, Capt. Dayton states, had to its credit a record of 5,000 miles, the awards, he says, having been based on the number of miles driven, the mechanical condition and the general appearance.

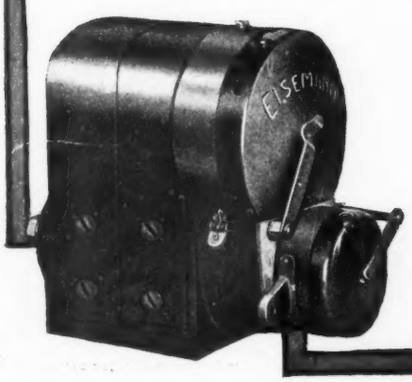
"The Quads had seen considerable usage," relates Capt. Dayton, "and the men in this organization were especially interested in the outcome."

During the war period the Nash Motors Company built more than 12,500 Nash Quads for military purposes.



Of Course, They're Equipped with the

EISEMANN MAGNETO



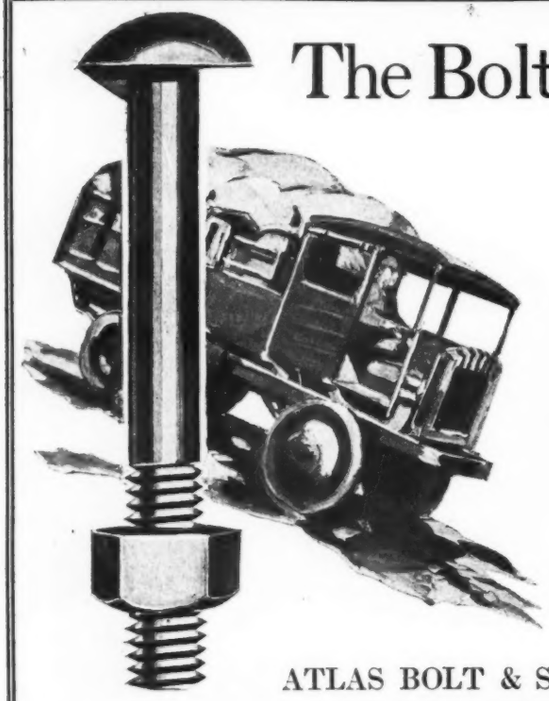
The vast majority of all trucks used by our Government in France were Eisemann-equipped—in the Ordnance, Signal Corps, Quartermaster, Ambulance and Medical Departments.

The magneto is the best ignition—
The Eisemann is the best magneto!

THE EISEMANN MAGNETO CO.

32 Thirty-third St., Brooklyn, N. Y.

Chicago: 910 So. Michigan Ave. Detroit: 85 Willis Ave., West.



The Bolts That Hold Their Own

in service—in accuracy—in delivery are the ones you will choose to uphold your reputation as a builder of trucks, tractors or passenger cars that will stand the strain of unexpected stresses.

ATLAS
BOLTS—SCREWS—RIVETS

are proof against breakage and stripping because they are made right and carefully all the way through from the raw material (carefully tested steel) to the final exacting inspection to insure accuracy. The accuracy of Atlas Products counts big in assembling—it steps up production.

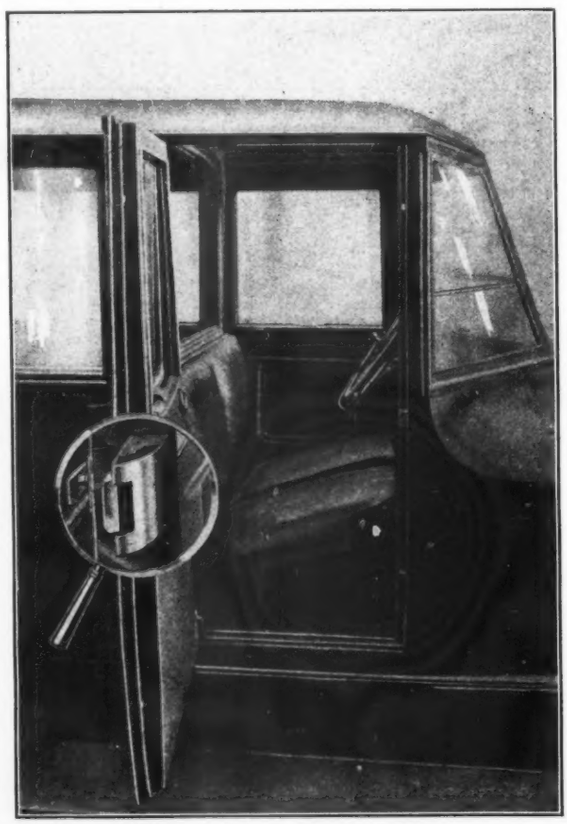
Highest Quality—Exacting Accuracy—Prompt Delivery

ATLAS BOLT & SCREW CO., Cleveland, Ohio

BOLT AND SCREW MAKERS TO THE AUTOMOTIVE INDUSTRY

Send for Our Interesting, Useful Catalog





Above illustration shows the "SEARS-CROSS LOCK" (as magnified) installed on door of a closed body

"SEARS-CROSS LOCK"

FOR AUTOMOBILE DOORS

"The Lock With The Expanding Latch"

(Manufactured under the Ottinger Patents)

It Prevents Rattling of Doors
Insures Positive Safety Protection Against Doors Opening Accidentally
Overcomes Present Difficulty in Opening and Closing of Doors
and
Automatically Takes Up Wear

The outward pressure of the rubber stops is taken care of by the inward pressure of the Expanding Latch which holds the doors tight so that they cannot rattle. The holding pressure is supplied by the lock and not by the rubber stops.

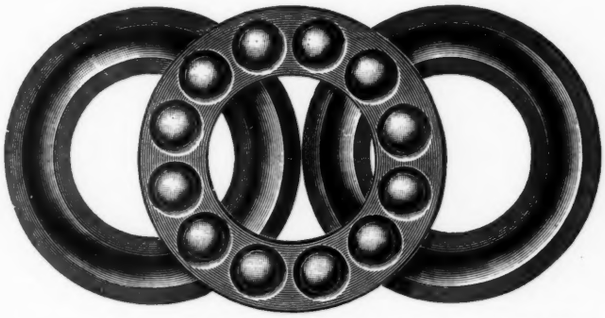
The only perfect automobile door lock. Brings about economy in cost of installation. Made for all priced cars, open and enclosed bodies.

SEARS-CROSS CO.

Bush Terminal BROOKLYN, N. Y.

BANTAM BALL THRUST BEARINGS = QUALITY DURABILITY SERVICE

20 YEARS EXPERIENCE



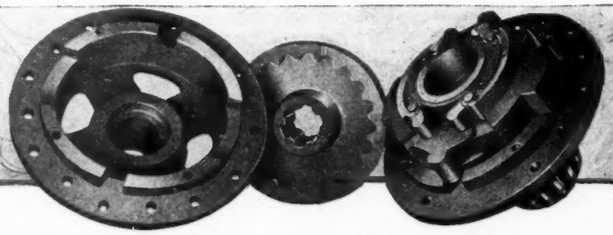
20 YEARS SUCCESS

OUR CATALOG TELLS THE STORY

PACIFIC OFFICE
F. M. Cobbledick Co.
693 Mission Street
San Francisco, Cal.

THE BANTAM BALL BEARING COMPANY
BANTAM, CONN.

DETROIT OFFICE
905 Dime Bank Building
DETROIT, MICH.



The Allen Differential

Saves gas; tires; wear.
Eliminates friction; lessens strain.
Makes skidding almost impossible.
Provides a positive two-wheel drive.
Pulls through mud, snow or sand, regardless of lost traction on either wheel.

Buyers are demanding the features that it provides. Don't overlook its value to your cars, trucks or tractors.

Manufactured by

The Fast Iron & Machine Co.
LIMA, OHIO, U.S.A.



Why Skid? The Allen Differential Will Stop It

It is a wonderfully efficient mechanism; gearless, frictionless, self-locking. The nearest approach to a solid axle of any mechanism, as yet invented, that affords positive compensation.

Eliminates all mechanical resistance against the motor, and greatly increases motive power.

A positive safety device; saves lives; trouble; worry; expense.

Think what these features mean as selling points for your cars or trucks.

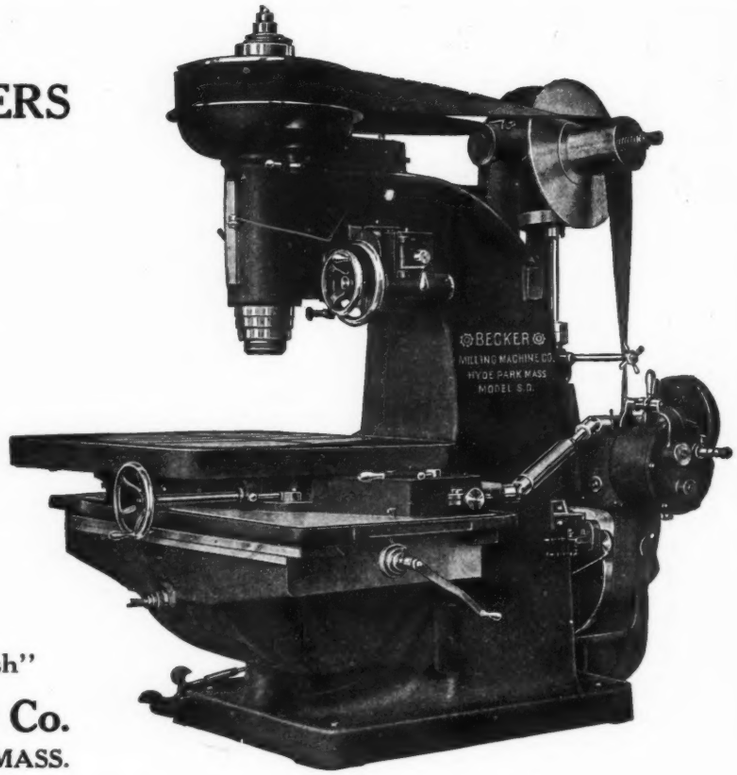
Becker
BELT DRIVEN MILLERS

For

GREATER PRODUCTION because they work continuously—every hour of operation is a production hour.

ECONOMY OF OPERATION because they are power savers; the internal belt drive forms an elastic drive to the spindle that prolongs the life of the cutter by eliminating chatter and vibration.

ACCURACY because the machines have exceptionally fine feeds and are equipped with micrometer dials and stop gauges. The Patent Becker Gibbing keeps the work permanently aligned with the spindle.



Write for circular SD TODAY
"The machine gives a smooth finish"

Becker Milling Machine Co.
HYDE PARK BOSTON, MASS.



Building Special Machinery *Since* 1875

On-time-to-the-minute Deliveries of Automotive Machinery

Over forty years of concentrated effort in special machinery building, an organization of skilled men and a complete, up-to-date equipment guarantee on-time-to-the-minute deliveries of work that will reflect the skill of the Cowdrey Organization throughout its long life.

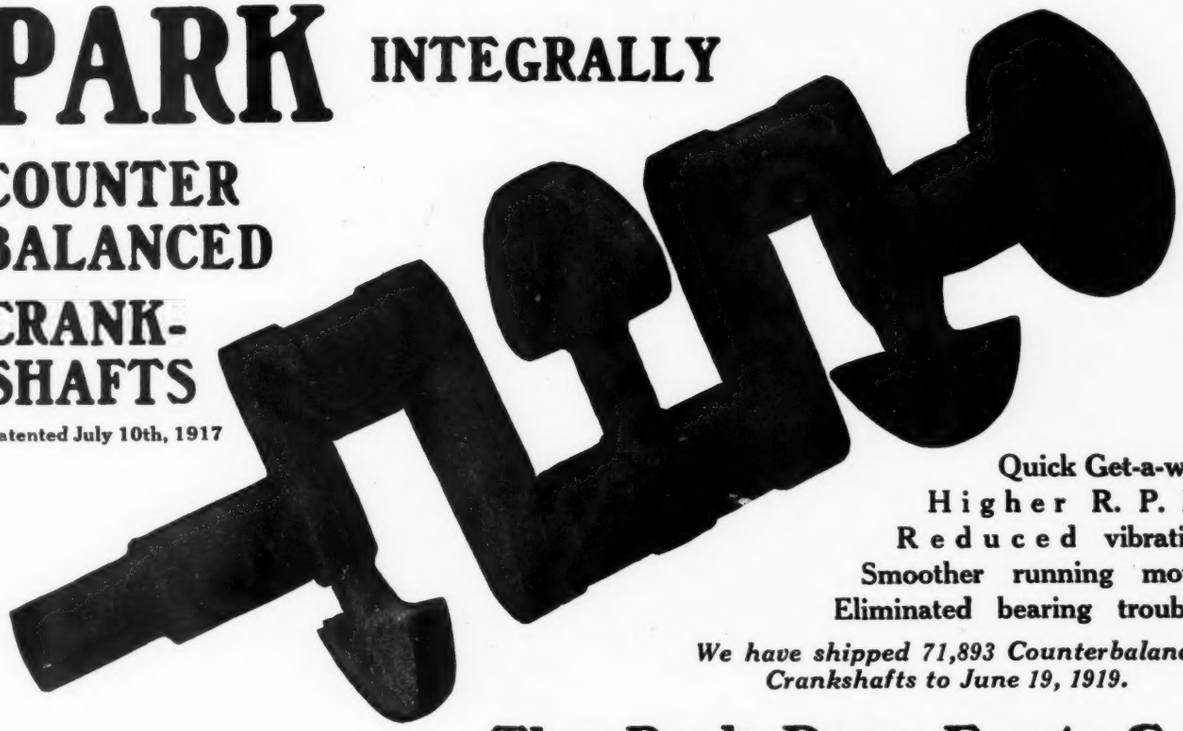
"COWDREY-BUILT" — your guarantee of skilled, accurate workmanship and on-time-to-the-minute deliveries.

Writing places you under no obligation and we will promptly reply in full.

C. H. COWDREY MACHINE WORKS
5 Main Street Fitchburg, Massachusetts

PARK INTEGRALLY COUNTER BALANCED CRANK-SHAFTS

Patented July 10th, 1917



Quick Get-a-way
Higher R. P. M.
Reduced vibration
Smoother running motor
Eliminated bearing troubles

We have shipped 71,893 Counterbalanced Crankshafts to June 19, 1919.

The Park Drop Forge Co.
Cleveland

NUTS

READY FOR DELIVERY

Plain and Castellated—
S.A.E.

Also

SCREWS

Cap—S.A.E. and U.S.S.
Set—U.S.S.

SPECIALS

made to customers' specifications up to 2¼" diameter, 10½" long. Quotations on samples or blue prints.



THE NATIONAL ACME CO
CLEVELAND OHIO
NEW YORK BOSTON CHICAGO
DETROIT SAN FRANCISCO ATLANTA



Quality

ENGINEERING practice in America has established the ball bearing as an essential in the best motor vehicles.

Based on competitive tests and actual past experience the preference of engineers seems to be focused on the New Departure line of Double Row, Single Row, Radax and Magneto Ball Bearings.

The "Ball Bearing Manual" is a new booklet of special value to those interested in bearing care and methods of assembly.

THE NEW DEPARTURE MFG. CO.,
Bristol, Conn.
451

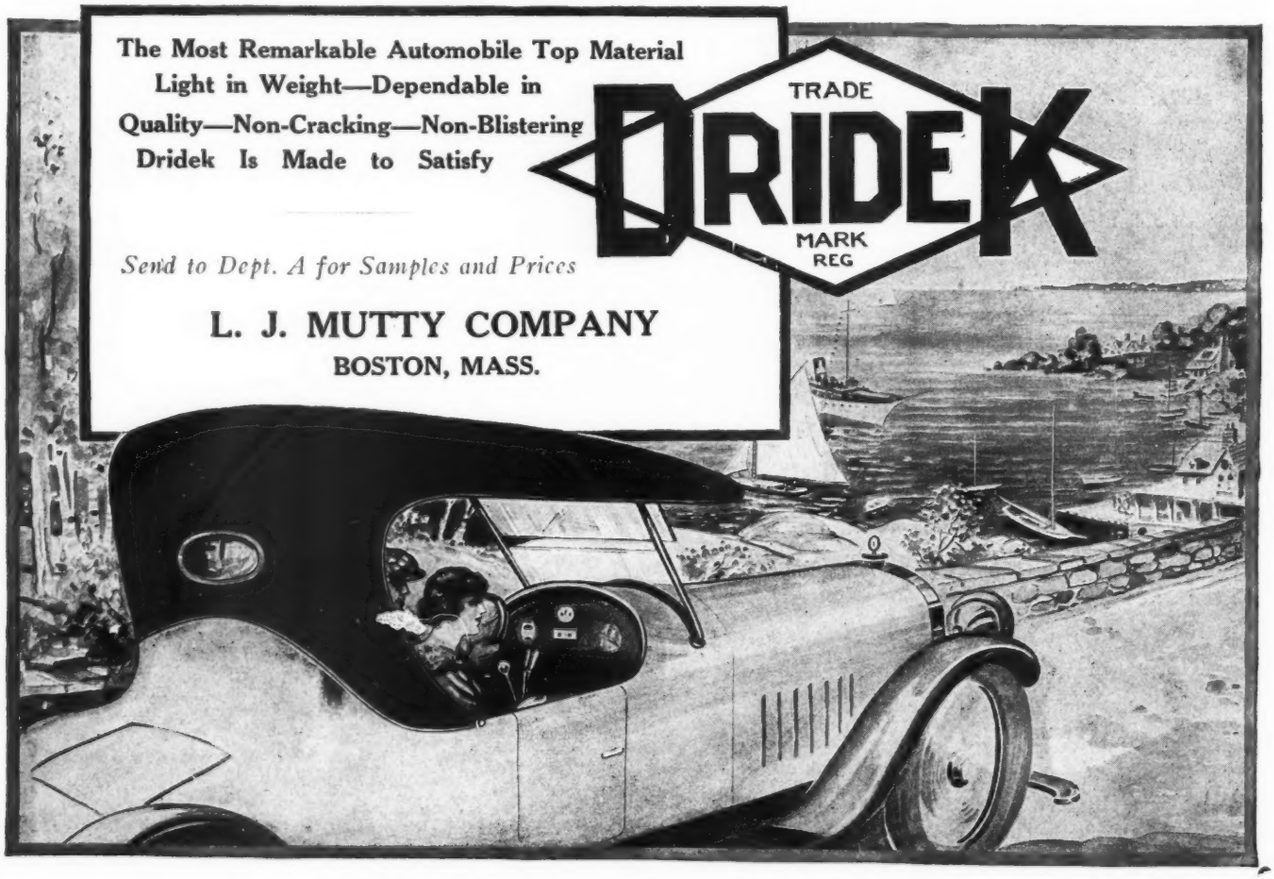
New Departure
Ball Bearings

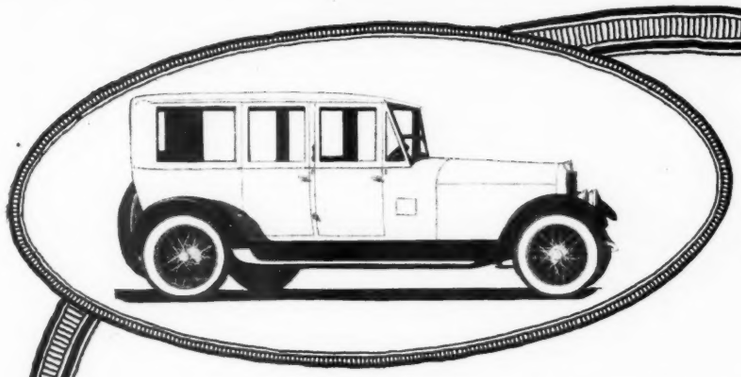
The Most Remarkable Automobile Top Material
Light in Weight—Dependable in
Quality—Non-Cracking—Non-Blistering
Dridek Is Made to Satisfy

TRADE DRIDEK MARK REG

Send to Dept. A for Samples and Prices

L. J. MUTTY COMPANY
BOSTON, MASS.





An example of Thompson Coach Work—
THE THAMES SEDAN

Have You a Problem Involving Body Building?

IF so, our organization of engineers, designers and decorators can very probably be of valuable service to you. We have had fourteen years of experience in engineering, sales and differential questions.

OUR mechanical equipment, shipping facilities and financial resources completely round out the co-operation we offer.

A consultation in person between your staff and ours will be arranged for.

E. J. THOMPSON CO.
Forbes Field

MOTOR CAR BODIES
Pittsburgh, Pa.

ARE You machining from solid stock when you could stamp or draw to size more economically?

Lots of folks who have done this in the past are now using metal stampings made on "BLISS" Presses.

We do *not* make stampings but we can tell you who does and---better still---we can give you the names of just the firms best fitted by experience and equipment to do exactly the thing you need.

Ask us—but don't forget to include a sketch and description of the article or parts

BLISS 1857

E. W. BLISS COMPANY

Main Office and Works: BROOKLYN, N. Y., U. S. A.

CHICAGO OFFICE People's Gas Bldg.
DETROIT OFFICE Dime Bank Bldg.
CLEVELAND OFFICE Union Bank Bldg.

BLISS 1919

LONDON, S. E., ENGLAND, Pocock Street, Blackfriars Road
PARIS, FRANCE, 100 Boulevard Victor-Hugo St. Ouen

A Natural Shock Absorber

IT IS an indisputable fact that no acceptable substitute for curled hair as an upholstery filler has as yet been discovered or invented.

But curled hair has been advanced a step farther in usefulness by the scientific methods of WILSON & CO.

WILSON *Woven* Curled Hair

is woven securely onto burlap forming a thick, sanitary, resilient pad which prevents the hair from shifting or bunching.

Its extraordinary resiliency is based on the concerted resisting power of millions of tiny hair spirals. These minature spirals everlastingly absorb shocks and pressures without losing their "pep" or springiness. They last —and there lies a tremendously important economy.

First cost is final cost, if you use *Wilson's Woven Curled Hair* to safeguard the seats and backs of your cars.

It is a prestige builder for the upholstery of which it is a part —and for the car of which you are the maker.

Send us blueprints of seats and backs, specify requirements, and we will submit prices and samples.

Write for our free booklet—"Comfort in Upholstery." Address Dept. A16

"This mark WILSON & CO. your guarantee"
CHICAGO

PISTON PINS **VALVE TAPPETS**

HARDENED and GROUND PARTS

DIE CASTINGS **SMALL STAMPINGS**

SPEEDOMETER PARTS
BUSHINGS, SHIMS, COVER PLATES

SCREW MACHINE PRODUCTS **SMALL UNIT ASSEMBLIES**

BOLTS FOR FLYWHEELS
CONNECTING RODS AND SPECIAL PURPOSES
WATER AND OIL PUMP AND SMALL PART ASSEMBLIES

THE RECORDING DEVICES CO.

556-576 W. 5th Street Dayton, Ohio

Manufacturers of synchronizers for the Liberty Motor, gun sights, gun mounts and bomb-release mechanism for the aircraft, and hundreds of small parts for the Government planes.

GASOLINE TANKS

Prompt delivery, combined with high class workmanship, is very desirable—but right now, both are very hard to obtain.

In view of this condition, automobile and truck manufacturers will find

G.P.&F. SERVICE "KNOWING HOW SINCE '81"

—specialized products and exceptional manufacturing facilities—invaluable to them.

We can assure prompt delivery on orders of any size—any type or size of tank, either welded or lock-seamed—a complete service at your service.

Our large, modern plant, covering 15 acres and our 36 years in making pressed steel parts, deserve your consideration.

Send us a sample or blue print and let our special Tank Dept. furnish you with an estimate.



GEUDER, PAESCHKE & FREY CO.
1422-1700 St. Paul Ave.
MILWAUKEE, WISCONSIN

Detroit Representative: Mr. R. W. Angstman, 1312 Dime Bank Bldg.

Try Diamond Fibre

If you need a tough, light weight material—high in tensile, shearing and compression strength—a non-conductor of electricity—a material with a high coefficient of friction—and one not affected by oil or grease—use Diamond Fibre.

If you need a material that will cut, thread, stamp or machine into any conceivable shape—with little wear on tools—a material that will do almost anything but mould—use Diamond Fibre.

Manufacturers in almost every line, Engineers, Electricians, Automobile Makers everywhere are daily finding new uses for this remarkable material. Perhaps it will help you in your business.

Supplied in sheets, rods, tubes and special shapes.

Diamond-F

We manufacture CELERON and CONDENSITE-CELERON—two remarkable, new water-resisting materials.

We also make the well-known line of DIAMOND-F PROTECTIVE PAPERS for food products, etc.

Diamond State Fibre Company

Bridgeport, Pa. Near Philadelphia.

Chicago Factory, 1656 Besley Court



The Super-Strong Link

Built to withstand solidly the severest road shock

A careful selection of the raw material, constant supervision during manufacture, a modern daylight plant and satisfied workmen combine to insure a product that is truly the best. Send us specifications of your drag link, starting crank, torque and spark-and-throttle control joint assemblies. You will find our prices and delivery right.

Cincinnati Ball Crank Company

1224 Dime Bank Bldg., Detroit, Mich. Oakley, Cincinnati, Ohio.

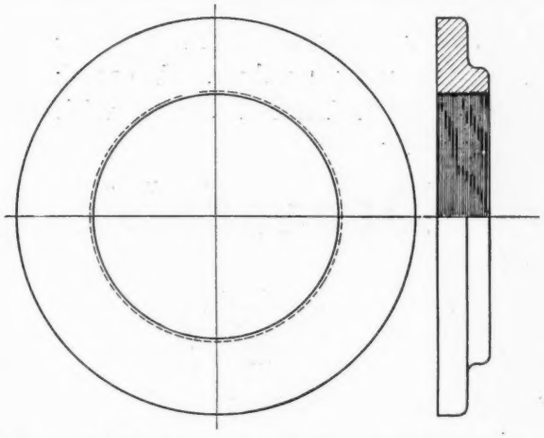
Actual Jobs—Actual Time Actual Proof

Of the Great Production Possibilities of

Smalley-General Thread Miller

No. 5

OF A SERIES



Thread 8 3/8" dia., 1 3/4" long, 8 p. Briggs Tapered

MACHINE—Smalley-General Thread Miller No. 1 air operated collet chuck.

TIME STUDY

	Min.	Sec.
Chucking, from floor		15
Facing 1/8" feed	1	40
Adjusting hob		10
Milling	2	30
Removing from chuck		10
Time Complete Operating, floor to floor	4 min.	45 sec.

MILLING FEED—10 1/2" per minute. Limits .003.

Entire flange finished in one chucking. Face and threads in perfect alignment.

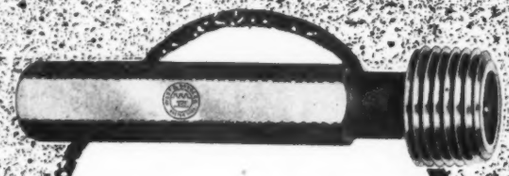
While this particular job may not be directly applicable to your particular business it shows the possibilities of thread milling if you cut threads in quantities. Smalley-General Thread Millers reduce costs, increase output and insure accurate work. Send blueprints for solution of your particular Thread Milling Problems.

Smalley-General Co., Inc.

Machinery Builders

Trumbull and Water Sts., Bay City, Mich.

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When you purchase thread gauges it isn't the tool you're buying, it's the accuracy it will insure in your product. West & Dodge Thread Gauge with their

Dependable

WEST & DODGE CO. THREAD GAUGE SPECIALISTS BOSTON MASS.

Accuracy

guard the accuracy of your product like a prize watch dog guards his master's house.

Our catalog should be on your desk. Your request will put it there.

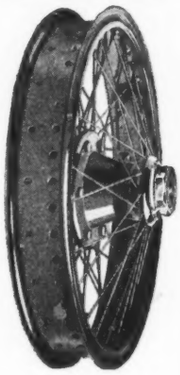
West & Dodge Co.
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Boston, Mass.



WEST & DODGE

WIRE WHEELS

HOUK QUICK CHANGE



We can supply immediately, sets of Houk Wire Wheels for all the cars listed and any of the service stations below will gladly install them.

Dealers should send at once for the particulars of our service and sales agency proposition.

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Cadillac	*Haynes*	*Overland*
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HOUSE EASY CHANGE



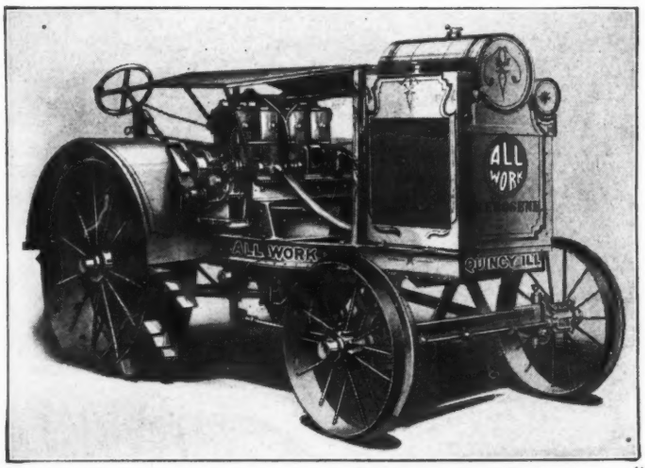
Set of 5 House Wire Wheels, 4 inner hubs, 4 hub caps, hub cap wrench, spoke nipple wrench, one hub dust cover for spare wheel. White, Black, Red; color optional. For Fords, **$65.**

For Chevrolet 490 and Overland Model 4, **$75.**

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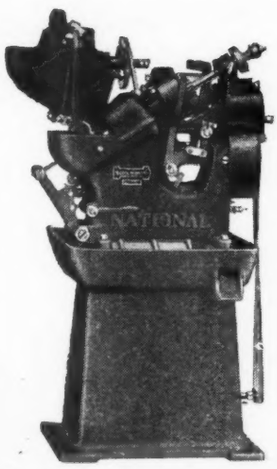
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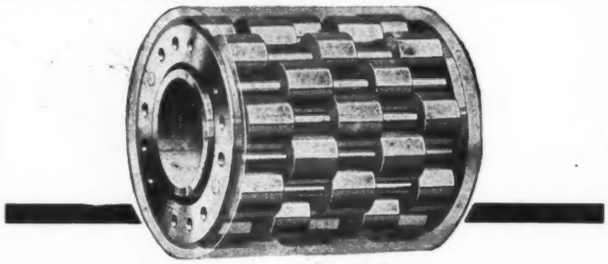
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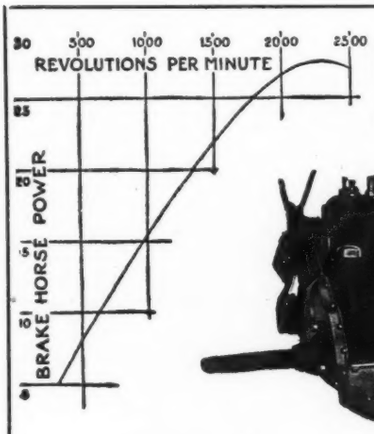


A Heavy Duty Service Bearing

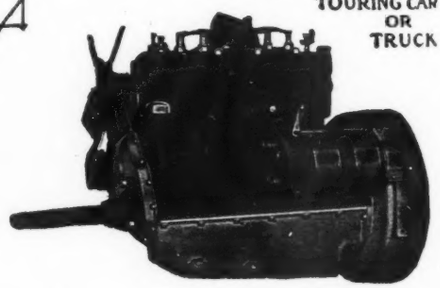
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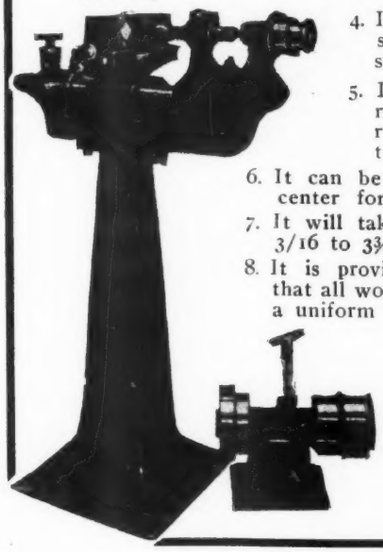
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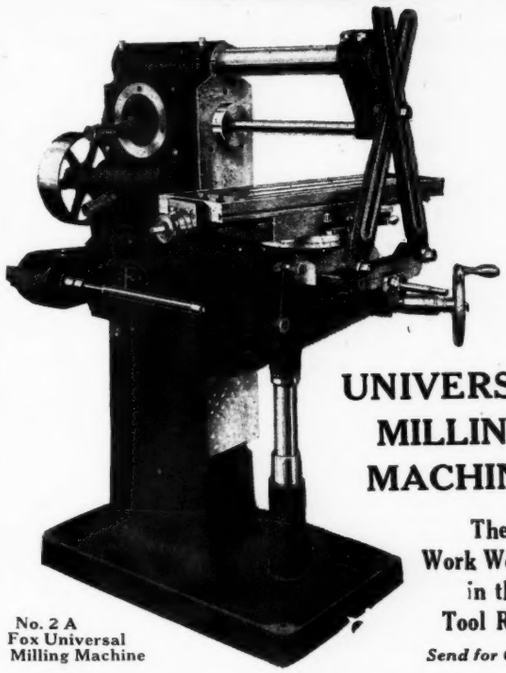
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2. It is accurate to within one-thousandth of an inch of the outside surface.
3. It is equipped with adjustment that insures such accuracy.
4. It is provided with two speeds for hard or soft stock.
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6. It can be easily adjusted off center for eccentric work.
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8. It is provided with a stop so that all work can be centered to a uniform depth.



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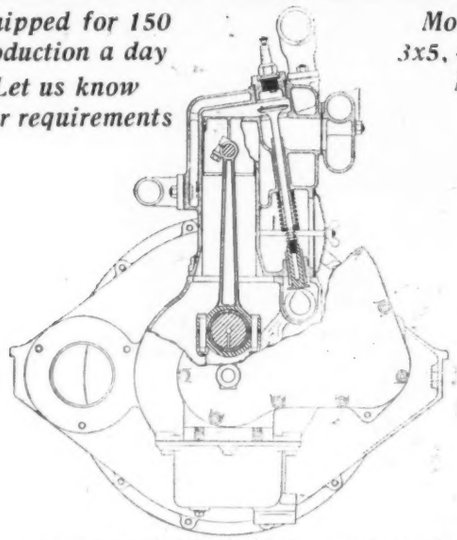
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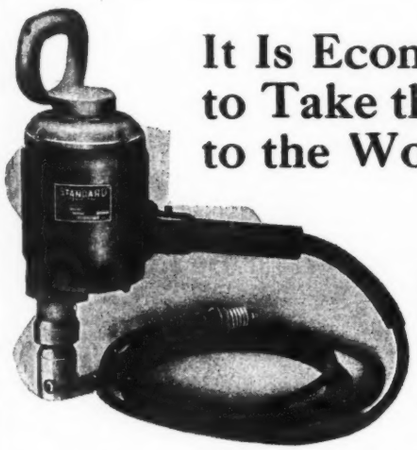
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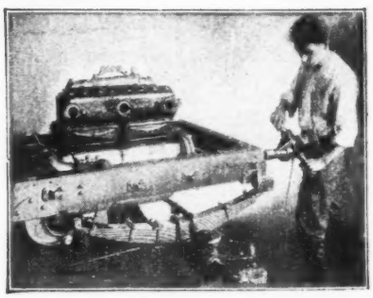


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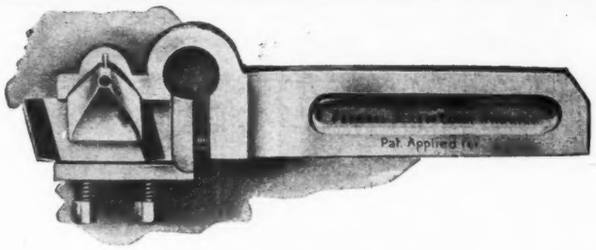
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Station A **Dept. 310**

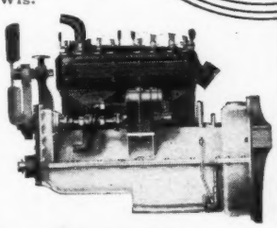
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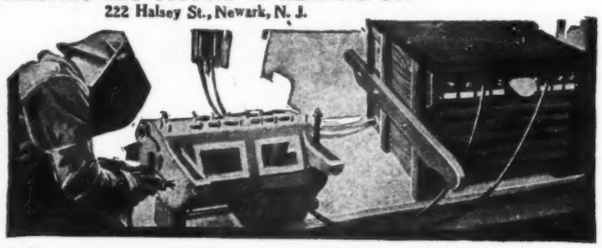
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MA This will identify the WHIPLESS AKIMOFF crankshaft, designed with the view of relieving the bearings from every ounce of load they do not absolutely HAVE to stand.

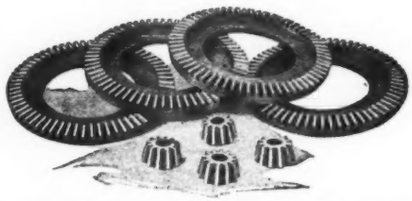
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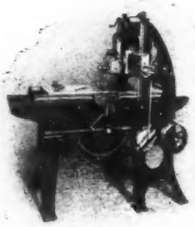
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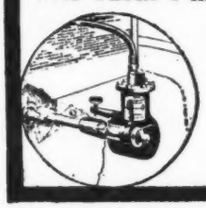


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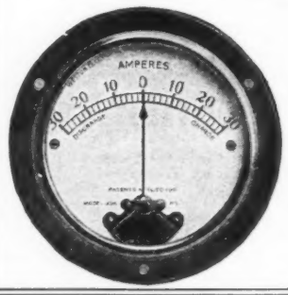
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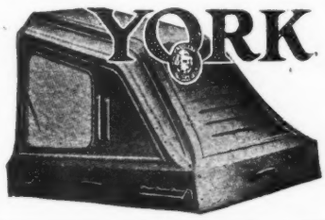
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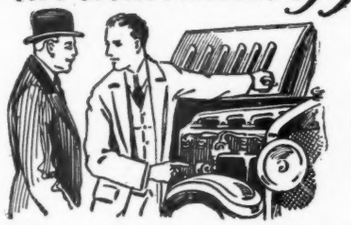
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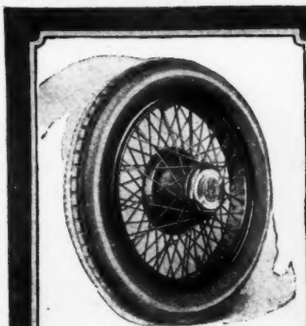


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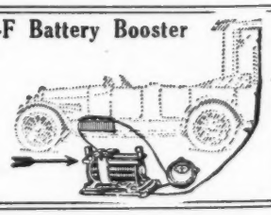
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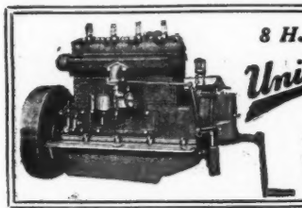
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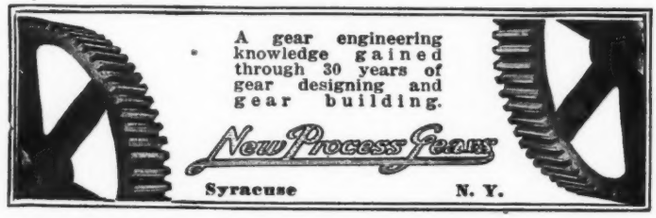
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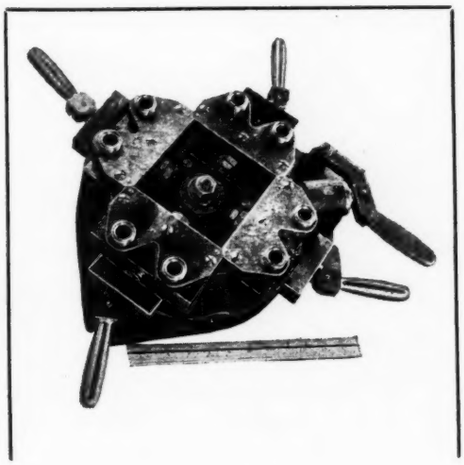
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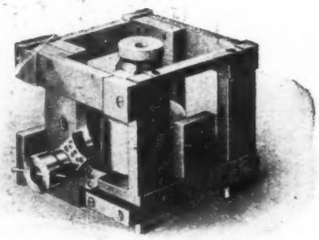
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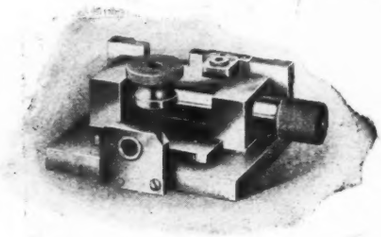
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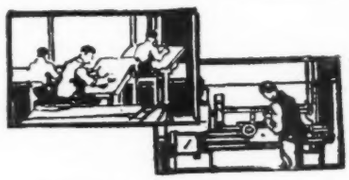
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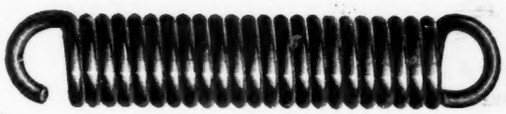
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If your manufacturing requirements cannot be handled by firms now advertising, we should appreciate the opportunity of locating a firm that can render such special service as your business may demand. Our investigation of the contract situation as it now stands places us in a position in which we can be of valuable service to the manufacturers of the automobile industry. If interested, please communicate the Contract Work Department.

Automotive Industries, 239 W. 39th St., New York City

When seeking manufacturing assistance consult with the Contract Work Service Department of AUTOMOTIVE INDUSTRIES.

Our Manufacturing clientele, interested in securing contract work and opportunities to figure on the manufacturing of motors, kerosene carburetors, shock absorbers, tractors and other new devices find it to their advantage to confer with the Contract Work Service Dept. of the AUTOMOTIVE INDUSTRIES.



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October 28th, 1918.

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Attention Mr. Arnold, Contract Department.

Dear Sirs:-

We wish to extend to you our thanks and appreciation for your successful efforts in locating a Factory for us which could manufacture Ford Front Springs, after all our efforts had failed. This information, which you were able to give us within a few weeks, is very much appreciated, and the Factory is now manufacturing Front Springs for us in large quantities, and the arrangement has proven satisfactory and beneficial to both them and us. We feel sure that it would pay manufacturers to keep in touch with you when they want business.

Thanking you for your assistance, we are

"Yours for Berlin in 1919"

WLE.MLK

AUTOMOBILE AND GARAGE EQUIPMENT



Manufacturing and Merchandising Opportunities

The items appearing in these columns form a part of the inquiries received by our Contract Work Service Department during the past three weeks. Manufacturers or concerns interested in these or similar inquiries can secure full information as to how this service is operated by communicating with the Contract Work Service Department, Automotive Industries, 239 W. 39th Street, New York City.

6052 Quotations desired on 8" and 3" brass bushings in lots of 1000.

6053 Inquiry received relative to a concern who can handle casting in 500, 1000 and 5000 lots. The casting to be about half the length of a sample on file in this department and is of cast steel.

6058 Manufacturers of electric specialties, located in Chicago, would like to get in touch with concerns who are equipped to manufacture high quality reflectors for automobile lamps. (Silver plated brass reflectors.)

6067 Inquiry received from New Jersey for a manufacturer of spark plugs in small lots, as samples of patent plug.

6068 French interests desire to represent American firms along lines of commercial or industrial relation connected with automotive work.

6072 A Missouri automobile sales company want to get in touch with a firm that will manufacture a blowout patch in quantities.

6073 Builders of high grade bodies are in the market for a quantity of wood carvings which they need for hearse and undertaker wagons.

6074 A New York firm desires to be placed in touch with manufacturers of standard equipment, such as front axles, rear axles, wheels, steering gears, frames, springs, in fact all parts of automobile except radiator, power plant and transmission.

6075 Inquiry received from Syracuse from company desirous of placing work covering forgings (bar) flattened small rounds; screw machine, pins (small) large head cap screws; springs, market spring wire (steel) springs, light wire, wound ⅝ dia. They are desirous of communicating with firms producing finished miscellaneous soft grey iron castings delivery same machined to drawings.

6076 New York concern desire to get in touch with a manufacturer equipped to handle what is known as a security robe rail, which is a two-piece rail, the upper bar being hinged at one end with a lock at the other; parts of this device will necessitate die-casting. They want these turned out in quantities of approximately 5,000 per month.

6078 Connecticut concern want to be placed in touch with gray iron foundries.

6080 Minnesota manufacturers of agricultural implements want to get in touch with a manufacturer in a position to produce a farm tractor in its entirety.

6048 Party owning an audible signal for road vehicles which device is automatic and can be used on commercial as well as on pleasure cars, is looking for manufacturing and merchandising assistance.

6049 Company owning a patented automobile signal, due to lack of funds to carry on the production of same, is looking for manufacturing and merchandising assistance. The signal is so constructed that it can be seen in daylight or dark, from the right or left and from the front or rear.

6050 Inquiry received relative to manufacturers who might be interested in a radiator that is non-breakable which is claimed to be far superior to the ordinary radiators in that it will freeze but will not burst, is more accessible for repairs and has enlarged cooling surface.

6051 Party located on the Pacific Coast is looking for manufacturing and merchandising assistance in connection with a circuit breaker and distributor on which he owns a patent; the system he claims is very simple.

6054 The owner of a patented baggage rack which folds down and makes a regular mat foot scraper when not in use as luggage carrier, wants to dispose of same on either a royalty basis or sell outright. It can be made of woven wire matting, cast iron or aluminum.

6055 Interests back of this inquiry are desirous of getting in touch with manufacturers who would like to investigate a tractor truck for railway passenger cars. Possibilities ahead are almost unlimited. Consultation is invited.

6056 This inquiry has to do with a shock absorber, the owner of which is looking for a manufacturer to place same on the market. This shock absorber is a new and highly improved method in Ford suspension.

6057 Party located at Wisconsin owning patents on a new automobile tire which he claims will outlast any tire on the market to-day. also that the tire is non-skid and blowouts are excluded, is desirous of disposing of the patents on a royalty basis or some other satisfactory arrangement.

6059 The holder of patents on an ignition lock for automobiles that is applicable to 90 per cent of the American cars, (all those using battery ignition) is desirous of getting in touch with some one who will manufacture the lock on a royalty basis or by purchasing the lock outright, or is willing to make any arrangement satisfactorily to the manufacturer, whereby he will net some profit.

6060 Owner of a patented differential and lock for motor vehicle drive axle is looking for manufacturing and merchandising assistance.

6061 This proposition has to do with an internal combustion engine, interests back of which are ready to place same on the market and want to get in touch with manufacturers.

6062 Inquiry received from party owning a patented kerosene and gasoline carburetor who wishes to sell same either outright or take small cash payment with the balance in royalties.

6063 Manufacturing and merchandising assistance required to place on the market an adjustable radiator fan.

6064 This proposition covers a safety stop on any auto in case of failure of brakes to hold on going up-hill when stalling motor or failure of getting into second or first gears, owner of which is looking to dispose of same and will consider any kind of an arrangement.

6065 A roller-bearing, the principal object of the invention being to provide an improved form of anti-friction bearing so arranged that both rotary and thrust friction will be reduced, party owning patents on this device is looking for a firm that will take this over on a royalty basis, or buy it outright.

6066 A New Yorker wants to enter into a satisfactory arrangement with a manufacturer in regards to disposing of trademark on a valve grinding compound with material and equipment necessary to commence manufacturing at once, would consider entering into a royalty arrangement.

6069 Tractor engineers have developed a small creeper type tractor which they wish to place on a royalty basis. Power steering, no brakes used and no loss of power when steering, three speeds forward and reverse, 18-10 h.p., thoroughly covered by eight patents and patent applications. Will submit proposition and demonstrate tractor to responsible manufacturers.

6070 This inquiry has to do with a ground gripping device for vehicle wheels which the owner wants to dispose of either outright or on a royalty basis.

6071 The owner of a new spark plug the object of which is to provide a novel means by which carbon may be kept from accumulating on the electrodes, and also to provide a way to prime an internal combustion engine through the spark plug, wants to get in touch with manufacturers in a position to finance the proposition.

6077 The owner of a positive gear drive transmission wants to sell the patents, or license its manufacture on a royalty basis.

6079 A wheel and rim corporation located in Ohio are seeking arrangements for the manufacture of a suspension wheel in a larger way, on royalty or some other business basis.

6081 New York interests are looking for a plant to manufacture a heavy duty 6" bore motor. It has been designed for use on rail cars, also for marine use.

6082 Owner of a permanent dust-proof grease-tight casing for steering connections is open to any equitable proposition, for sale outright, for manufacture and marketing on a royalty basis, or for marketing only.

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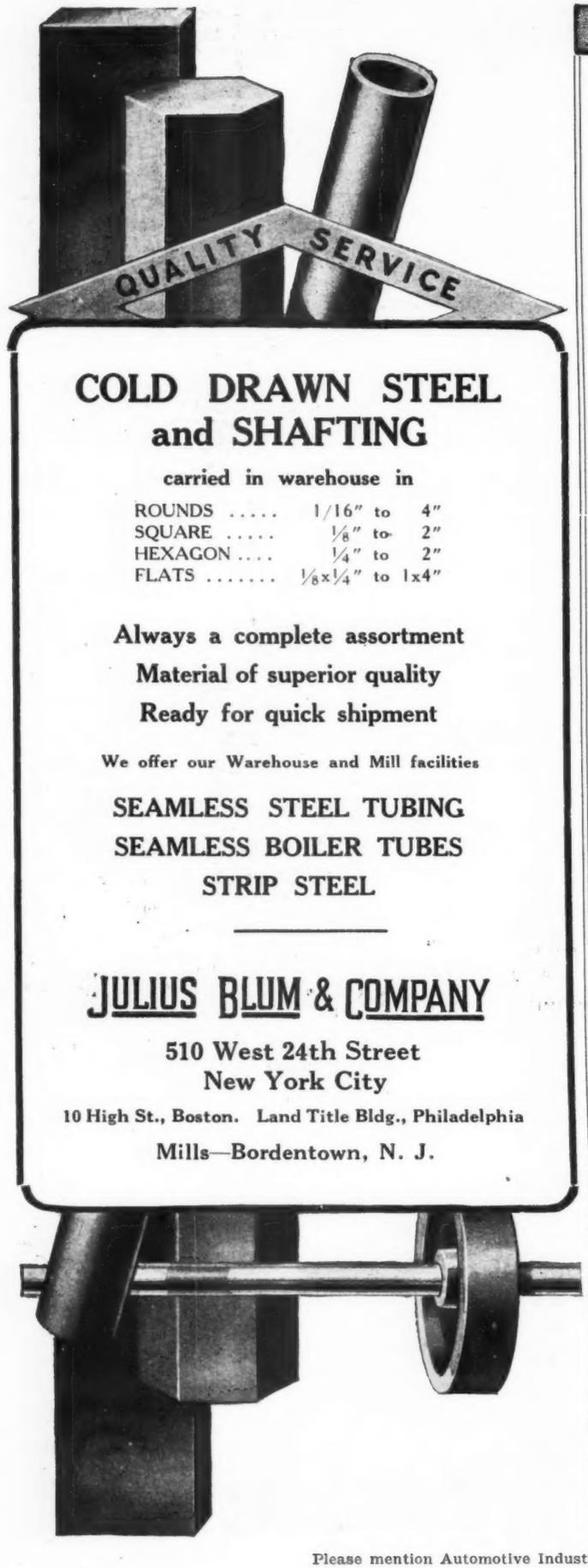
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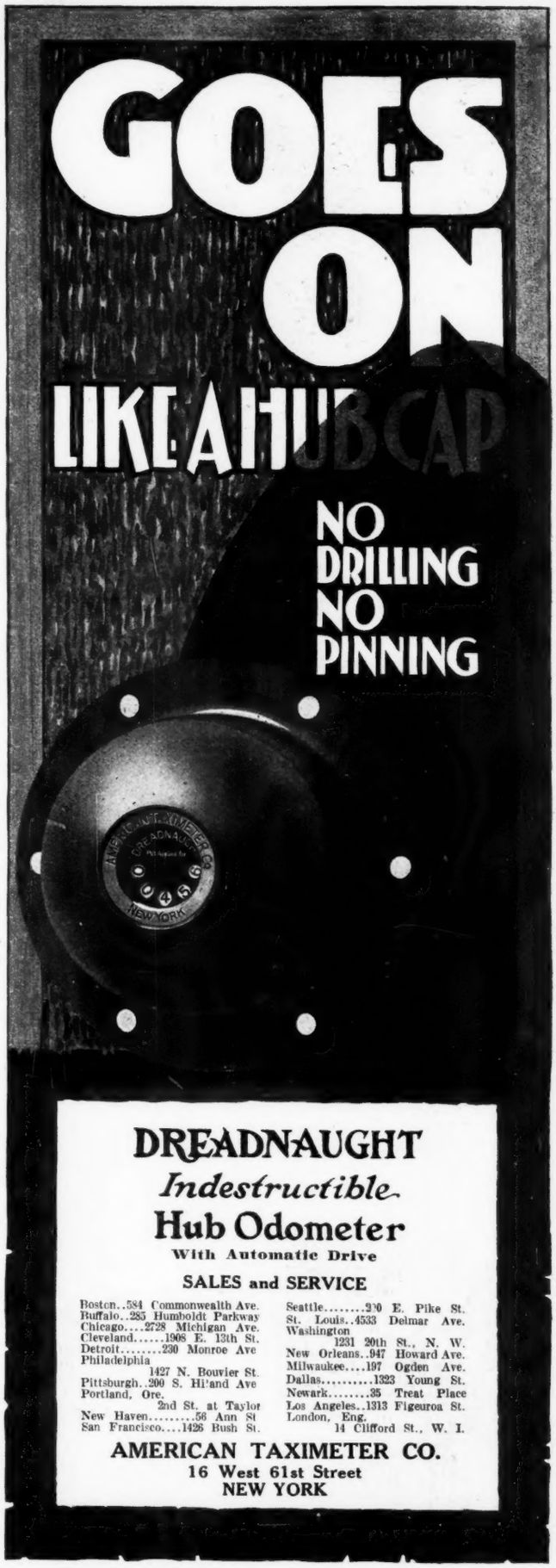
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